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Guidance for the Reregistration of Pesticide Products Containing Chloropicrin (081501) as the Active Ingredient

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This document contains information regarding the reregistration of pesticide products containing the subject active ingredient. The document includes how to register under a registration standard, regulatory position and rationale, and summaries of data requirements and data gaps. Also included is a bibliography containing citations of all studies reviewed by EPA in arriving at the positions and conclusions contained in the standard.

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GUIDANCE FOR THE
REREGISTRATION OF PESTICIDE PRODUCTS
CONTAINING AS THE ACTIVE INGREDIENT

CHLOROPICRIN
(081501)

CASE NUMBER 0040

CAS 76-06-2

ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF PESTICIDE PROGRAMS

WASHINGTON, D. C. 20460

September 1982

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INTRODUCTION

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA Section 3(g), as amended in 1978, directs EPA to reregister all pesticides as expeditiously as possible. Each registrant of a currently registered product who wishes to continue to sell or distribute that product in commerce must apply for reregistration.

This guidance document sets forth the requirements for registration and reregistration of all manufacturing use products (MUPs) containing the subject chemical as the sole active ingredient. These requirements are: that certain scientific data be submitted; that certain standards of toxicity, composition, labeling, and packaging be met; and that the data compensation provisions of FIFRA Section 3(c)(1)(D) be satisfied. Registrants of MUPs are referred to all Sections and Tables for specific information regarding their responsibilities under this guidance document.

This guidance document also sets forth the data requirements and compensation responsibilities for those end-use products which contain the subject active ingredient and for which the source of that active ingredient is (1) not registered with EPA or (2) produced by the registrant's firm, or a firm which has ownership in common with the registrant's firm, or (3) both (1) and (2). Registrants of such end-use products can exempt themselves from these requirements if they change their source of supply to a registered source, provided the source (i.e., registered active ingredient product) is obtained from a firm that does not share ownership in common with the registrant's firm. (If the end-use product registrant decides to switch sources, a new Confidential Statement of Formula, EPA Form 8570-4, must be submitted to the appropriate Product Manager within 90 days of receipt of this guidance document.) Registrants of affected end-use products are referred to only Sections II, III, IV, and VII and Table A for specific information regarding thei responsibilities under this guidance document.

It should be noted that end-use products containing the subject active ingredient will not be reregistered at this time. Any necessary labeling changes will be implemented under the Agency's Label Improvement Program at a future time.

EPA will issue a notice of intent to cancel or suspend the registration of any currently registered product if the registrant fails to comply with the requirements set forth in this guidance document.

This guidance document has been prepared to provide registrants with specific information on how they may reregister their manufacturing-use products or maintain their end-use products' registration. (Refer to the cover letter's attachment for a listing of your affected products.) If for any reason you decide to request that the Agency discontinue the registration of any of your products subject to the registration requirements in this document, please notify the Product Manager named in the cover letter, within 90 days from receipt of this document, that you wish to voluntarily cancel the registration(s). If you decide to maintain your product registration(s), you must provide the information described in the following pages within the time frames outlined.

REGULATORY POSITION AND RATIONALE

FOR CHLOROPICRIN

A. Introduction
B. Description of Chemical
C. Use Profile
D. Regulatory Position
E. Regulatory Rationale
F. Criteria for Registration Under the Standard
G. Acceptable Ranges and Limits
H. Required Labeling
I. Tolerance Reassessment

A. Introduction

This chapter is the central part of the Guidance Document. It presents the Agency's regulatory position, based on an evaluation of the use patterns of all registered products containing chloropicrin as the sole active ingredient or in combination with other active ingredients in a mixture. The regulatory position contained in the Guidance Document reflects a review only of this chemical and not of other active ingredients in a mixture.

B. Description of Chemical

Chloropicrin is the EPA-accepted common name. Trichloronitromethane is the chemical name approved by the American Chemical Society. Other chemical names are nitrochloroform and nitrotrichloromethane. The empirical formula for chloropicrin is CCl_3NO_2. The Office of Pesticide Programs' internal control number is 081501 and Chemical Abstract Service Registry Number is 76-06-2. Chloropicrin is available in liquid formulations.

C. Use Profile

Manufacturing use products (MUP's) containing chloropicrin as a sole active ingredient may be formulated into end-use products (EUP's) classified as a "Restricted Use" pesticide (40 CFR 162.31) for use by or under the direct supervision of Certified Applicators for control of stored grain insect/pests and of soil borne insects and diseases in various application sites including preplant soil fumigation; fumigation of the following raw agricultural commodities (barley, buckwheat, corn (including popcorn), oats, rye, rice, grain sorghum and wheat) in storage trucks, vans, box cars; soil fumigation of nursery plants in nurseries; soil fumigation of orchards; fumigation of dumps, dwellings, rodent burrows and food milling machinery.

D. Regulatory Position

Chloropicrin, as described in this Standard, may be registered for sale, distribution, reformulation and use in the United States. The Agency has considered the available scientific data obtained from the open literature and the data submitted by the registrants. In view of this information, the

Agency finds that none of the risk criteria found in Section 162.11(a) of Title 40 of the U. S. Code of Federal Regulations have been met or exceeded by chloropicrin; that is, properly labelled products when used as directed, will not cause unreasonable adverse effects to man or to the environment.

Currently registered technical and manufacturing use products containing chloropicrin as the sole active ingredient may be reregistered under this Standard, subject to the conditions imposed herein. New MUP products may be registered under this Standard and are subject to the same requirements. Registrants having products not conforming to this standard must apply to amend the standard so those products could be registered. Mixtures and end-use products containing chloropicrin may not be registered or reregistered under this guidance package. However, the use patterns of mixtures and end-use products are considered for purposes of determining generic data requirements for the active ingredient chloropicrin.

The Agency has concluded that registration for Chloropicrin should continue for the following reasons:

1. Manufacturing-use products may only be formulated into end-use products containing chloropicrin classified as "Restricted Use Pesticides" for controlling stored grain pests, for controlling soil borne diseases, insects and weeds, and for controlling rodents. The only General Use EUP registrations are in mixture formulations with 2% or less chloropicrin active ingredient, applied as a warning agent in combination with methyl bromide in cans containing 1 1/2 lbs. or less.

2. Due to the requirements for a full face gas mask approved by NIOSH and for other label precautions, repeated direct human exposure to chloropicrin products for technical and manufacturing-use products is not expected.

3. No chronic or sub-chronic toxicological hazards of immediate concern to humans or the environment have been identified. Chronic studies are deferred until residue, hydrolysis, aerobic and anaerobic soil metabolism, and mobility studies are submitted and reviewed. The Agency will review those date to determine if chronic exposure occurs and whether chronic toxicological data are needed.

4. The environmental hazard precautions for the technical and manufacturing use products (see Section H) will be adequate to prevent ecological hazards.

5. While there is evidence that residues of chloropicrin may be detected in grains, additional data are needed to adequately evaluate this possibility. Meanwhile, the exemption from tolerance for stored grains will remain in effect. Similarly, residue data will be required for preplant soil fumigated crops to determine whether residues of chloropicrin occur from that use. When such data are submitted, the Agency will decide whether or not tolerances need to be established for these crops.

6. The Pesticide Incident Monitoring Systems data (1979 and 1982 updated) indicate that accidents involving chloropicrin resulted from misuse of end-use registered products. Applicators and non-applicators have been

adversely affected by chloropicrin under accidental entry, intentional entry without protective equipment and under conditions which were assumed to be safe based on the labeling directions as described in Section H.

7. Although there are some data gaps, the Agency's policy is not to cancel or to withhold registration merely for the lack of data. (See sections 3(c)(2)(B) and 3(c)(7) of FIFRA.) Rather, publication of the standard provides a mechanism for identifying data needs, and registration under the standard allows for upgrading of labels during the period in which the required data are being generated. When these data are received, they will be reviewed by the Agency. The Agency will then determine whether these data will affect the registration of this chemical.

F. Criteria for Registration Under the Guidance Document

Any manufacturing-use products meeting the following criteria are subject to this document.

1. Contain chloropicrin as the sole active ingredient.
2. Conform to the acute toxicity limits, product composition and use pattern requirements stated in section G.

The applicant for registration or re-registration of products subject to this document must comply with all terms and conditions described in this document including a commitment to fill data gaps on time schedule specified by the Agency and, when applicable.

G. Acceptable Ranges and Limits for Manufacturing Use Products

1. Product Composition Standard

To be covered under this document, technical and manufacturing-use products must contain 96.5% or more chloropicrin as the sole active ingredient. The composition of each formulation proposed for registration must be fully described within appropriate certification limits. Products which are not substantially similar to currently registered products must meet the data requirements listed in Tables A and B.

2. Acute Toxicity Limits

The Agency will consider registration of technical and manufacturing-use products containing chloropicrin 96.5% or above, regardless of the acute toxicity category, provided that the labeling of such products bear appropriate precautionary statements.

3. Use Patterns

To be registered under this guidance document, manufacturing-use products containing chloropicrin must be labeled for formulation into end-use products for use as a fumigant for the control of stored grain insects/pests, weeds, soil borne insects/diseases, for the following use patterns, provided tolerances are established or an exemption from tolerances is in effect.

a. Non-Domestic, Outdoor food/feed (soil fumigation)
b. Non-Domestic, Indoor food/feed (soil fumigation, e.g. nursery beds)
c. Non-Domestic, Indoor non-food/non-feed (ornamentals in green-houses and nurseries)
d. Non-Domestic, Food-Feed (raw agricultural commodities, processed food)
e. Domestic, Non-Food/Non-Feed (dwellings, empty potato storage, empty seed storage areas)
f. Non-Domestic, Food-Feed (flour & feed mills, milling machinery)
g. Non-Domestic, Non-Food/Non-Feed (wood poles, pilings, garbage dumps)
h. Non-Domestic, Domestic, Food-Feed (rodent burrows) Indoor-Outdoor
i. Non-Domestic, Non-Food/Non-Feed (rodent burrows) Indoor-Outdoor

H. Required Labeling

All technical and manufacturing use products containing chloropicrin must bear appropriate labeling as specified in 40 CFR 162.10. This guidance package contains specific information regarding label requirements. The following statements must appear on all labels:

STATEMENT OF PRACTICAL TREATMENT (Front panel, below ingredient statement)

If inhaled- Remove victim to fresh air immediately. Keep victim lying down and warm. Give artificial respiration if breathing has stopped. Call physician immediately.

If on skin- Remove all contaminated clothing and shoes immediately. Wash exposed areas thoroughly with soap and water. If a rash or blister develops, get medical attention. Clean or launder contaminated clothing before re-use. Do not re-use clothing or shoes until completely free of chemical odor.

If in eyes- Flush with running water for at least 15 minutes. Get medical attention promptly.

PRECAUTIONARY STATEMENTS (side panel)
HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Danger:- Poisonous liquid and vapor. Contact with liquid may produce burns. Do not breath vapor. Do not get in eyes, on skin, or clothing. Wash all contaminated clothing with soap and water before re-use. Do not re-use contaminated clothing or shoes until free of chemical odor.

Table A

Generic Data Requirements for Products Containing Chloropicrin

Guidelines Citation	Name of Test	Composition and Use Pattern	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data be Submitted Under FIFRA 3(c)(2)(B)?[1]
163.61-3	Product Identity Disclosure of Ingredients	Technical Grade (≥96.5%) All Uses[2]	Partially[3]	GS-0040-003 GS-0040-004 GS-0040-006 GS-0040-007 GS-0040-008 GS-0040-018	Yes
163.61-4	Description of Manufacturing Process	Technical Grade (≥96.5%) All Uses[2]	Partially[3]	05017364 05019348 GS-0040-008 GS-0040-019 GS-0040-020 GS-0040-003 GS-0040-004 GS-0040-021	Yes
163.61-5	Discussion of Formation of Unintentional Ingredients	Technical Grade (≥96.5%) All Uses[2]	No[3]	--	Yes
163.61-6	Declaration and Certification of Ingredient Limits	Technical Grade (≥96.5%) All Uses[2]	Partially[4]	GS-0040-022	Yes
163.61-7	Product Analytical Methods and Data	Technical Grade (≥96.5%) All Uses[2]	Yes	GS-0040-012 05014112 05014119 05013941 GS-0040-013 GS-0040-023 GS-0040-034	No

Table A (Cont'd)

Product Specific Manufacturing Use Data Requirements for Chloropicrin

Guidelines Citation	Name of Test	Composition and Use Pattern	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data be Submitted Under FIFRA 3(c)(2)(B)?1/
163.61-8	Physical/Chemical Properties				
163.61-8(c)(2)	Color	Technical Grade (≥96.5%) All Uses2/	Yes	00013159 00012912 05019916	No
163.61-8(c)(3)	Physical State	Technical Grade (≥96.5%) All Uses2/	Yes	00013159 00012912 05019916	No
163.61-8(c)(4)	Odor	Technical Grade (≥96.5%) All Uses2/	Yes	00013159 00012912 05019916 00013198 05019759	No
163.61-8(c)(6)	Boiling Point	Technical Grade (≥96.5%) All Uses2/	Yes	00012912 00013198 00013159 05019916	No
163.61-8(c)(7)	Density, bulk density, or specific gravity	Technical Grade(≥96.5%) All Uses2/	Yes	00013198 00013159 00012912 05019916	No
163.61-8(c)(8)	Solubility	Technical Grade(≥96.5%) All Uses2/	Yes	00012912 00013198 00013159	No

Table A (Cont'd)

Generic Data Requirements for Chloropicrin

Guidelines Citation	Name of Test	Composition and Use Pattern	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data be Submitted Under FIFRA 3(c)(2)(B)?1/
163.61-8(c)(9)	Vapor Pressure	Technical Grade (≥96.5%) All Uses2/	Yes	00013159 00012912 05019916	No
163.61-8(c)(11)	Octanol/Water Partition Coefficient	Technical Grade (≥96.5%) All Uses2/	No		Yes
163.61-8(c)(13)	Stability	Technical Grade (≥96.5%) All Uses2/	Yes	05019759 00013198 GS-0040-010	No
163.161	Degradation				
163.161-1	Hydrolysis	All outdoor domestic and non-domestic uses -soil fumigation for food and non-food crops5/ Non-domestic, indoor food, non-food uses - nurseries, ornamentals and soil fumigation5/	No	-	Yes
163.161-2	Photodegradation in water	All outdoor non-domestic uses-soil fumigation for food and non-food crops5/ All indoor non-domestic food and non-food uses-nurseries ornamentals and soil fumigation5/	No	-	Yes
163.161-3	Photodegradation on soil	All outdoor, non-domestic uses5/	No	-	Waived 6/

Table A (Cont'd)
Generic Data Requirements for Chloropicrin

Guidelines Citation	Name of Test	Composition and Use Pattern	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data be Submitted Under FIFRA 3(c)(2)(B)?1/
163.161-4	Photodegradation in air	All non-domestic outdoor food/feed crop uses - soil fumigation5/	Yes	05007865	No
163.162	**Metabolism Studies**				
163.162-1	Aerobic Soil	All non-domestic food/feed, nonfood/ nonfeed indoor/outdoor uses- soil fumigation, nurseries and ornamentals5/	No	-	Yes
163.162-2	Anaerobic Soil	All non-domestic food/feed outdoor uses - soil fumigation5/	No	-	Yes
	Microbiological				
Reserved	Effects of microbes on pesticides	Reserved7/	No	-	Reserved7/
Reserved	Effects of pesticides on microbes	Reserved7/	No		Reserved7/
Reserved	Activated Sludge Metabolism	Reserved7/	No	-	Reserved7/

Table A (Cont'd)
Generic Data Requirements for Chloropicrin

Guidelines Citation	Name of Test	Composition and Use Pattern	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Reference	Must Additional Data be Submitted Under FIFRA 3(c)(2)(B)?[1]
163.163	Mobility				
163.163-1	Leaching	Domestic outdoor uses - soil fumigation[5] Non-domestic outdoor/indoor uses-soil fumigation, nurseries and ornamentals[5]	Partially	05018301	Yes Need adsorption/ desorption study
163.163-2	Laboratory volatility	Non-domestic outdoor food uses - soil fumigation[8] Non-domestic indoor uses-soil fumigation, nurseries and and ornamentals[8]	No	-	Yes
163.163-3	Field volatity	Non-domestic indoor uses - soil fumigation, nurseries and ornamentals[8]	No	-	Reserved[9]
163.164	Dissipation				
163.164-1	Field Dissipation Terrestrial	All non-domestic outdoor uses - soil fumigation[8]	No		Reserved[10]
163.164-5	Dissipation - Long-Term Studies	All non-domestic outdoor uses - soil fumigation[8]	No		Reserved[11]
163.165	Accumulation				
163.165-4	Laboratory Studies-Fish[12]	All non-domestic outdoor uses - soil fumigation [8]	No	-	Reserved[13]

Table A (Cont'd)
Generic Data Requirements for Chloropicrin

Guidelines Citation	Name of Test	Composition and Use Pattern	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data be Submitted Under FIFRA 3(c)(2)(B)?[1]
163.165-5	Field Accumulation Aquatic Non-Target[14]	All non-domestic outdoor uses - soil fumigation[8]	No	-	Reserved[13]
Subpart K	Reentry[15]	All non-domestic outdoor uses - soil fumigation[10, 14] All non-domestic indoor uses - soil fumigation, nurseries and ornamentals[10, 14]	No	-	Label changes (reentry information needed for all sites)
163.71-1	Avian Single-Dose Oral LD_{50}	Non-domestic outdoor - soil fumigation [22]	--	--	No[16]
163.71-2	Avian Dietary LC_{50}	Non-domestic outdoor - soil fumigation [22]	--	--	No[16]
163.72-1	Fish Acute LC_{50}	Technical Grade Non-domestic outdoor uses - soil fumigation [22]	Yes	GS-0040-016 GS-0040-017	No
163.72-2	Acute Toxicity to Aquatic Invertebrates	Technical Grade Non-domestic outdoor uses - soil fumigation [22]	No	--	Yes

TABLE A (Cont'd)
Generic Data Requirements for Chloropicrin

Guidelines Citation	Name of Test	Composition and Use Pattern	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data be Submitted Under FIFRA 3(c)(2)(B)?[1/]
163.81-1	Acute Oral Toxicity	Technical Grade ($\geq$96.5%) All Uses[2/]	Partially	05014376	No[17/]
163.81-2	Acute Dermal Toxicity	Technical Grade ($\geq$96.5%) All Uses[2/]	Partially	05014376	No[17/]
163.81-3	Acute Inhalation Toxicity	Technical Grade ($\geq$96.5%) All Uses[2/]	Partially	05014376	No[17/]
163.81-4	Primary Eye Irritation	Technical Grade ($\geq$96.5%) All Uses[2/]	No	-	No[18/]
163.81-5	Primary Dermal Irritation	Technical Grade ($\geq$96.5%) All Uses[2/]	No	-	No[18/]
163.81-6	Dermal Sensitization	Technical Grade ($\geq$96.5%) All Uses[2/]	No	-	No[18/]
163.81-7	Delayed Neurotoxicity	Technical Grade ($\geq$96.5%) All Uses[2/]	No	-	No[18/]
163.82-1	Subchronic Oral Toxicity	Technical Grade ($\geq$96.5%) All Uses[2/]	No	-	Reserved[19/]
163.82-2	Subchronic 21-day Dermal Toxicity	Technical Grade ($\geq$96.5%) All Uses[2/]	No	-	Reserved[19/]

TABLE A (Cont'd)

Generic Data Requirements for Chloropicrin Toxicology

Guidelines Citation	Name of Test	Composition and Use Pattern	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data be Submitted Under FIFRA 3(c)(2)(B)?[1]
163.82-3	Subchronic 90-day Dermal Toxicity	Technical Grade (≥96.5%) All Uses[2]	No	-	Reserved[19]
163.82-4	Subchronic Inhalation Toxicity	Technical Grade (≥96.5%) All Uses[2]	No	-	Reserved[19]
163.83-1	Chronic Feeding	Technical Grade (≥96.5%) All Uses[2]	No	-	Reserved[19]
163.83-2	Oncogenicity	Technical Grade (≥96.5%) All Uses[2]	No	-	Reserved[19]
163.83-3	Teraogenicity	Technical Grade (≥96.5%) All Uses[2]	No	-	Reserved[19]
163.83-4	Reproduction	Technical Grade (≥96.5%) All Uses[2]	No	-	Reserved[19]
163.84-2 through -4	Mutagenicity	Technical Grade (≥96.5%) All Uses[2]	NO	-	Reserved[19]
163.85-1	Metabolism (Identification of metabolites)	Technical Grade (≥96.5%) All Uses[2]	No	-	Reserved[19]

Table A (Cont'd)
Generic Data Requirements for Chloropicrin

Guidelines Citation	Name of Test	Composition and Use Pattern	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data be Submitted Under FIFRA 3(c)(2)(B)?[1]
--	Nature of residue in plants	Non-domestic outdoor/ indoor uses - soil fumigation[5]	No	--	Yes[20]
--	Nature of residue in food-producing animals	--	No	--	Yes[21]
--	Analytical methods	All non-domestic food/feed uses[5]	Partially	00012916 05014119 00022930 05017475 05017924	Yes
--	Residue data: raw agricultural commodities	All grains for which it is registered[5]	Partially	GS-0040-028 00013061 00013060 GS-0040-011 05014591 05014119	Yes
--	Residue data: processed food	Processed food prepared from chloropicrin treated raw agricultural commodities[5]	Partially	05014591 GS-0040-015 GS-0040-011	Reserved[21]
--	Residue data: meat, milk, poultry and eggs	Grains, plants and plant products treated with chloropicrin and consumed by animals.[5]	No	--	Reserved[21]
--	Storage stability data for residues	Yes (if samplings are not analyzed within 2 months)[5]	No	--	Yes

1/ Product Chemistry and Acute Toxicity data must be submitted by __________. All other data must be submitted by ____________________.

2/ All use patterns for chloropicrin are classified as follows:

- o Non-domestic, outdoor food/feed (soil fumigation)
- o Non-domestic, indoor, food/feed (nursery beds)
- o Non-domestic, indoor nonfood/nonfeed (green-houses, nurseries and ornamentals)
- o Non-domestic, food/feed (raw agricultural commodities, processed food)
- o Domestic, non-food/non-feed (dwellings, empty potato storage areas, empty seed storage areas, etc.)
- o Non-domestic, food/feed (flour and feed mills, milling machinery)
- o Non-domestic, non-food/non-feed (wood poles, pilings, garbage dumps)
- o Domestic, non-domestic food/feed (rodent burrows).
- o Domestic, non-domestic, non-food/non-feed (rodent burrows).

3/ Updated information must be supplied on identity and quantity of impurities and inerts.

4/ A certification of ingredient limits must be supplied.

5/ Radiolabeled analytical grade or non-radiolabeled technical.

6/ Waived for soil injection use only.

7/ The requirement for the submission of these data is currently being reserved pending the development and modification of the testing protocols by the Agency.

8/ A representative formulated product.

9/ Required by Agency on a case-by-case basis, depending upon data derived from laboratory volatility tests.

10/ Deferred pending results from hydrolysis and soil metabolism studies.

11/ Require if dissipation rate shown by tests per Sec. 163.162-1 or 163.164-1 is less than 50%.

12/ Fish accumulation data will not normally be required in situations where the registrant can offer acceptable evidence showing that the active ingredient and/or its principal degradation product(s):

- Will not reach water, or
- Will not persist in water (i.e., a half-life of approximately 4 days or less) and has properties suggesting:
  - A relatively low potential for accumulation in fish (i.e., an octanol/water partition coefficient less than 1,000) or
  - A lack of accumulation in the organs and tissues of mammals or birds.

13/ Pending receipt of data on soil metabolism and leaching.

14/ Field accumulation studies in aquatic non-target organisms are required to support the registration of each end-use product:

- Which is intended for forestry use, aquatic non-crop use, or aquatic impact use that results in direct discharges;
- For which data from a laboratory fish accumulation study are required by Section 163.165-4; and
- For which no tolerance or action level for fish has been granted.

15/ For each crop, the registrant must propose an acceptable reentry interval; this proposed interval may be based on any of the following: (1) the longest (most restrictive) existing reentry intervals; (b) data on dissipation of foliar residues (decline curve), on human exposure to those residues, and on the inherent toxicity of the chemical; (c) determination of that time beyond which there are no detectable foliar residues (under appropriate climatic conditions) in the area where the chemical will be applied. Either the longest (most restrictive) reentry interval is acceptable, or the exposure data and a dislodgeable residue curve, together with the inherent toxicity of the chemical, may be used to establish an appropriate interval for activities that result in foliar contact. The longest (most restrictive) reentry intervals will be listed by crop.

16/ Although these studies are normally required of the technical material for registration, these requirements are being waived due to the highly volatile nature of chloropicrin and the reduced exposure potential.

17/ The 'No' category for missing studies indicates that further testing is being waived because of restricted use category and the precaution on the labeling required because of toxicity of CP and/or its co-fumigant.

18/ Not being required because repeated exposure to these products is not expected based on label precautions.

19/ All subchronic and chronic requirements are deferred until additional residue, hydrolysis, aerobic, anaerobic soil metabolism and mobility data are submitted and reviewed. Those studies will be reviewed to determine if chronic exposure occurs and whether chronic toxicity data are required.

20/ This requirement also includes data on residues of chloropicrin and its breakdown products (if any) in or on grain from postharvest fumigation.

21/ These requirements are waived if no residues of chloropicrin or its breakdown products are detected in or on the raw agricultural commodities or the fumigated grains eaten by food-producing animals, or if no such residues occur in meat, milk, poultry and eggs.

22/ Submit data on non-radiolabeled technical material.

Table B
Product-Specific Data Requirements for Manufacturing-Use Products Containing Chloropicrin

delines tation	Name of Test	Composition	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data be Submitted Under FIFRA 3(c)(2)(B)?[1/]
.61-3	Product Identity Disclosure of Ingredients	Technical Grade (≥96.5%)	Partially[2/]	GS-0040-003 GS-0040-004 GS-0040-006 GS-0040-007 GS-0040-008 GS-0040-018	Yes
.61-4	Description of Manufacturing Process	Technical Grade (≥96.5%)	Partially[2/]	05017364 05019348 GS-0040-008 GS-0040-019 GS-0040-020 GS-0040-003 GS-0040-004 GS-0040-021	Yes
.61-5	Discussion of Formation of Unintentional Ingredients	Technical Grade (≥96.5%)	No	--	Yes
.61-6	Declaration and Certification of Ingredient Limits	Technical Grade (≥96.5%)	Partially[3/]	GS-0040-022	Yes
.61-7	Product Analytical Methods and Data	Technical Grade (≥96.5%)	Yes	GS-0040-012 05014112 05014119 05013941 GS-0040-013 GS-0040-023 GS-0040-034	No

Table B (Cont'd)
Product-Specific Data Requirements for Manufacturing-Use Products Containing Chloropicrin

Guidelines Citation	Name of Test	Composition	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data be Submitted Under FIFRA 3(c)(2)(B)?1/
163.61-8	Physical/Chemical Properties				
163.61-8(c)(2)	Color	Technical Grade (≥96.5%)	Yes	00013159 00012912 05019916	No
163.61-8(c)(3)	Physical State	Technical Grade (≥96.5%)	Yes	00013159 00012912 05019916	No
163.61-8(c)(4)	Odor	Technical Grade (≥96.5%)	Yes	00013159 00012912 05019916 00013198 05019759	No
163.61-8(c)(5)	Melting point	Technical Grade (≥96.5%)	Yes	00013159 00012912	No
163.61-8(c)(6)	Boiling Point	Technical Grade (≥96.5%)	Yes	00012912 00013198 00013159 05019916	No
163.61-8(c)(7)	Density, bulk density, or specific gravity	Technical Grade (≥96.5%)	Yes	00013198 00013159 00012912 05019916	No
163.61-8(c)(8)	Solubility	Technical Grade (≥96.5%)	Yes	00012912 00013198 00013159	No

Table B (Co d)

Product-Specific Data Requirements for Manufacturing-Use Products Containing Chloropicrin

Guidelines Citation	Name of Test	Composition	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA 3(c)(2)(B)?[1]
163.61-8(c)(9)	Vapor Pressure	Technical Grade (≥96.5%)	Yes	00013159 00012912 05019916	No
163.61-8(c)(11)	Octanol/Water Partition Coefficient	Technical Grade (≥96.5%)	No		Yes
163.61-8(c)(13)	Stability	Technical Grade (≥96.5%)	Yes	05019759 00013198 GS-0040-010	No
163.61-8(c)(14)	Oxidizing/Reducing Action	Technical Grade (≥96.5%) all uses	Partially	GS-0040-011	Yes
163.61-8(c)(15)	Flammability	Technical Grade (≥96.5%)	Yes	00012912 00013159 00013198	No
163.61-8(c)(16)	Explodability	Technical Grade (≥96.5%)	Partially	GS-0040-014	Yes
163.61-8(c)(17)	Storage Stability	Technical Grade (≥96.5%)	Yes	00013198	No
163.61-8(c)(18)	Viscosity	Technical Grade (≥96.5%)	No	--	Yes
163.61-8(c)(19)	Miscibility	Technical Grade (≥96.5%)	No	--	Reserved[4]
163.61-8(c)(20)	Corrosion Characteristics	Technical Grade (≥96.5%)	Yes	00013198 GS-0040-007	No

Table B (Cont'd)

Product-Specific Data Requirements for Manufacturing-Use Products containing Chloropicrin

Guidelines Citation	Name of Test	Composition	Does EPA Have Data to Partially or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data be Submitted Under FIFRA 3(c)(2)(B)?1/
163.81-1	Acute Oral Toxicity	Each Formulation	No		No5/
163.81-2	Acute Dermal Toxicity	Each Formulation	No		No5/
163.81-3	Acute Inhalation Toxicity	Each Formulation	No		No5/
163.81-4	Primary Eye Irritation	Each Formulation	No6/	-	No6/
163.81-5	Primary Dermal Toxicity	Each Formulation	No6/	-	No6/
163.81-6	Dermal Sensitization	Each Formulation	No6/	-	No6/
163.81-7	Delayed Neurotoxicity	Each Formulation	No6/	-	No6/

1/ Product Chemistry and Acute Toxicity data must be submitted by ___________

2/ Updated information must be supplied on identity and quantity of impurities and inerts.

3/ A certification of ingredient limits must be supplied.

4/ Not applicable unless used in emulsified end-use products.

5/ Acute oral toxicity studies on the MUP were not available but are being waived, since the Agency has determined by extrapolation that its toxicity is substantially similar to the technical chemical 05014376.

6/ Not being required because repeated exposure to these products is not expected based on label precautions to wear a respirator and to avoid contact.

PRODUCT CHEMISTRY

A. Chemical Identity

B. Manufacturing Process

C. Formation of Unintentional Ingredients

D. Percentage of Active Ingredient

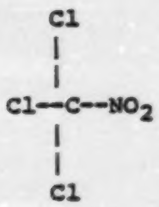
E. Product Analytical Methods and Data

F. Physical and Chemical Properties

G. Summary of Major Data Gaps

A. Chemical Identity (163.61-3)

Chloropicrin



$$\begin{array}{c} Cl \\ | \\ Cl{-}{-}C{-}{-}NO_2 \\ | \\ Cl \end{array}$$

(CCl_3NO_2)

In the United States, "chloropicrin" is the "official" common name for this insecticidal-herbicidal-fungicidal-rodenticidal fumigant. (There is no American National Standards Institute designation.)

trichloronitromethane	(American Chemical Society, Chemical Abstracts Service, 8th and 9th Collective Indexes name for chloropicrin, GS-0040-018)

nitrochloroform
nitrotrichloromethane

Acquinite
Chlor-O-Pic
Dojyopicrin
Dolochlor
G-25
Klop
Larvacide 100
Microlysin
Nemax
Pic-Clor
Picfume
Profume A
PS

S-1
Tear Gas
Tri-clor
Vomiting Gas

(The following trade names are associated with mixtures of chloropicrin with other chemicals; commonly methyl bromide, ethylene dibromide, or chlorinated C_3-hydrocarbons: Brozone, Dowfume, Telone, Brom-O-Gas, Brom-O-Sol, Terr-O-Gas, Terr-O-Gel, Terr-O-Cide.)

Reference is given to GS-0040-003, GS-0040-004, GS-0040-006, GS-0040-007, GS-0040-008 and GS-0040-018 for the above names in general.

Identifying characteristics of chloropicrin are:

Empirical Formula: CCl_3NO_2

Elemental Composition:	carbon	7.31%
	oxygen	19.47%
	nitrogen	8.52%
	chlorine	64.71%

OPP (internal control) No.:	081501
CAS Registry No.:	76-06-2
Wiswesser Line Notation:	WNXGGG
Molecular Weight:	164.38

B. Manufacturing Process (163.61-4)

Chloropicrin was first prepared in 1848 by Stenhouse from picric acid and bleach powder (GS-0040-008). The first use of chloropicrin was in chemical warfare by the Allied troops in 1918. It was prepared in large quantities at Edgewood Arsenal-during World War I by a method patented by Sweeney (U.S. Pat. No. 1,413,198; 1922; GS-0040-019) and described as follows (05017364; 1940): "Picric acid, hydrated lime, and water were mixed to form a calcium picrate suspension. This suspension together with a suspension of bleaching powder and water was run into a still. The chloropicrin was steam-distilled off."

Hu et al., (1957, 05019348) discuss the possibility of manufacturing chloropicrin from the "nontoxic isomers of 666" (lindane). Sittig, in Pesticide Manufacturing and Toxic Materials Control Encyclopedia (1980; GS-0040-020), states that chloropicrin can also be made by the chlorination of nitromethane in the presence of caustic (i.e., alkaline hypochlorite), with a yield of about 94.5%, and attributes the process to Wilhelm (US Pat. No. 3,106,588; 1963; GS-0040-021).

Present information available to the Agency indicates that the only current domestic manufacturers of chloropicrin are Niklor Chemical Co. (Long Beach, Calif.) and International Minerals & Chemical Corp. (Terre Haute, Ind). Partial descriptions of their production processes, considered confidential business information, were submitted in August (Niklor; GS-0040-003) and September (IMC; GS-0040-004) of 1981.

C. Formation of Unintentional Ingredients (163.61-5)

No theoretical discussions have ever been submitted - nor can be found - on possible contaminants in the technical products, other than those chemicals described in the confidential formulas of the two basic producers. Neither manufacturer has attached any quantitative data to its list of impurities and reaction compounds identifying each compound down to 0.1%. This constitutes a major data gap.

D. Active Ingredient Limits in Pesticide Products (163.61-6)

According to the Agency's current records (see Qualitative Use Assessment for Chloropicrin, internal paper of July 17, 1981; GS-0040-009), there are only 20 registered products with chloropicrin as the single active ingredient; at least 9 of these are sold intrastate only. Four products claim 96.5% a.i., 2 (state) products, 70% and 85% a.i. (no formulas are available), and all the rest claim 99% a.i. Except for the two state labels with lower percentages of active ingredient, all the remaining labels (at 96.5% and 99%) are for end-use as well as manufacturing-use and technical grade products.

In 1976, IMC submitted to the Agency a new confidential formula, revising their previous label claim of 99.0% a.i. to 96.5%. Therefore, any claim of over 96.5% for technical chloropicrin (GS-0040-022) is questionable and requires resolution. The lack of information needed to resolve this question constitutes a data gap.

E. Product Analytical Methods and Data (163.61-7)

Two analytical methods obtained from Dow Chemical Co. were supplied by the EPA National Enforcement Investigations Center in Denver (GS-0040-034). The first (1971, Dow Method No. 60174; GS-0040-13) describes the procedure for the analysis of "Picfume," a product containing chloropicrin as the sole active ingredient. A gas chromatographic column of polyethylene glycol/silica beads is used with a thermal conductivity detector. Under the conditions described, peak area percent and weight percent are considered approximately equivalent; a representative chromatogram of the single peak obtained is included. No data are given on reproducibility.

Another method (1969, Dow Method No. 23965a; GS-0040-012) describes the determination of chloropicrin in "Dowfume" - a mixture with methyl bromide. A gas chromatographic column of silicone absorbent used with a thermistor detector is described, resulting in a single chloropicrin peak (representative chromatogram included). Again, the weight percent is considered proportional to the peak area. The standard deviation is given as 0.03%; it is stated that the values obtained do not vary from the average by more than 0.06% at the 95% confidence level.

These gas chromatographic methods, as summarized above, are considered adequate for product enforcement purposes.

There are no methods for chloropicrin listed in the EPA Manual of Chemical Methods for Pesticides and Devices (1976, plus supplements; GS-0040-023). It is suggested that the better of these gas chromatographic methods be tried out by Chemical and Biological Investigations Branch (CBIB), Benefits and Field Studies Division (BFSD), Office of Pesticide Programs (OPP) (Beltsville) for possible incorporation into the Manual.

Among older methods were colorimetric ones, some of only qualitative use. Feinsilver and Oberst (1953, 05014119) decomposed chloropicrin in hot alcoholic sodium peroxide solution; nitrite was determined colorimetrically with the Bratton-Marshall coupling reagents (sulfanilamide and N-(1-naphthyl) ethylenediamine dihydrochloride). (This method showed an improved sensitivity - down to 3 mg/M^3 air - and became the basis for the analytical methods used for obtaining residue data).

Berck, in Canada, considered the above method not adequately reproducible at low concentrations, as well as too time-consuming. He described a polarographic method of increased precision (1962, 05014112) and, in 1965, a gas chromatographic method which would readily measure 1 mcgm amounts of individual fumigants in a mixture of other fumigants. However, his GC results on both technical and reagent-grade chloropicrin showed 3 peaks which he was not able to resolve (1965, 05013941).

F. Physical/Chemical Properties (163.61-8)

The following information was supplied as noted on the technical chemical:

1. Color

Colorless (Dow; 00013159 and 00012912); sometimes slightly yellowish (Ioanid; 05019916).

2. Physical State

Liquid (Dow; 00013159 and 00012912)
Oily Liquid (Ioanid; 05019916)

3. Odor

Strongly lachrymatory (Dow, 00013159 and 00012912; Niklor, 00013198); lachrymatory, tussive, nauseous (Moureu, 05019759); characteristic smell (Ioanid, 05019916).

4. Melting Point

-64°C (freezing point) (Dow; 00013159 and 00012912).

5. Boiling Point

112°C at 760 mm Hg (Dow, 00013159 and 00012912); Ioanid, 05019916)
112.3°C (Niklor, 00013198)

(Note: At boiling point, slowly decomposes to $COCl_2$ and NOCl)

6. Density, Bulk Density, or Specific Gravity

1.653 at 25°/25°C (13.7 lbs/gal) (Niklor, 00013198)
1.656 at 20°/4°C (Dow, 00013159 and 00012912; Ioanid, 05019916)
13.8 lbs/gal) at 20°C (Dow, 00013159 and 00012912)
Specific gravity (vapor): 5.69 times heavier than air (Ioanid, 05019916)

7. Solubility

g/100g solvent at 25°C (approx.) (Dow, 00013159 and 00012912)

acetone ∞
benzene ∞
CCl_4 ∞
ethyl ether ∞
methanol ∞
water 0.2

Chloropicrin in water, 25°C, 0.1621 g/100 cc (Niklor, 00013198)
water in chloropicrin, 32°C, 0.1003 g/100 g.

Soluble in alcohol, petroleum solvents, chlorinated solvents, carbon disulfide.

8. Vapor Pressure

Dow: 18.3 mm Hg at 20°C (00013159 and 00012912)

Ioanid (05019916):

°C	mm Hg
0	5.91
10	10.87
15	14.12
20	16.91
25	23.81
30	30.50
35	40.14
50	80.7

9. Octanol/Water Partition Coefficient

No information.

10. Stability

Chloropicrin emits highly toxic fumes on heating to decomposition (Sax, N.I.: Dangerous Properties of Industrial Materials 4th ed. Van Nostrand Reinhold, 1975, GS-0040-010).

Forms phosgene ($COCl_2$) and nitrosyl chloride (NOCl) when irradiated with sun light (Moureu, 05019759).

$$CCl_3NO_2 \rightarrow COCl_2 + NOCl$$

At boiling point, slowly decomposes to $COCl_2$ and NOCl

Decomposes in water solution; rapidly, when sodium bisulfite is added (Niklor, 00013198).

11. Oxidizing or Reducing Action

Oxidizing, under certain conditions (Agency file on PP# 54, GS-0040-011).

12. Flammability

Nonflammable (flash point - none) (Dow, 00013159 and 00012912; Niklor, 00013198)

13. Explosiveness

Known to explode (Kirk-Othmer, Encyclopedia of Chemical Technology, Interscience Encyclopedia, Inc., 1949, GS-0040-014).

14. Storage Stability

Dissolves vinyl chloride and other resins; does not dissolve polyethylene or polypropylene resins (Niklor, 00013198). Should be stored and shipped in plain steel cylinders with brass valves.

15. Viscosity

No information.

16. Miscibility

No information. N/A unless used in emulsified end-use products.

17. Corrosion Characteristics

"Water in chloropicrin causes decomposition of the chloropicrin to form corrosive substances which attack valves and steel containers." (Niklor, 00013198).

Worthing, Pesticide Manual, 6th ed., 1979, (GS-0040-007): "... non-corrosive to copper, brass and bronze but attacks iron, zinc and other light metals; the formation of a protective coating permits storage in iron or galvanized containers."

G. Summary of Data Gaps

The Agency will require data on the manufacturing process for technical products which will include the identification of all ingredients down to 0.1%, a certification of ingredient limits, and a theoretical discussion of the formation of unintentional ingredients. In addition, the octanol/water partition coefficient will be required for technical products.

The data on oxidizing/reducing action, explodability, and viscosity will be required on each manufacturing-use product in the time limit specified.

Miscibility data on each manufacturing-use product will be required in the future only if emulsified end-use products are registered.

ENVIRONMENTAL FATE

A. Use Profile

B. Environmental Fate Profile

C. Exposure Profile

D. Summary of Data Gaps

E. Label Restrictions

A. Use Profile

1. Use Assessment

Chloropicrin is the common name for trichloronitromethane. This chemical has pesticidal uses as a herbicide, insecticide, rodenticide, nematocide and fungicide. This report covers uses for the single active ingredient products and chloropicrin in mixtures.

Use sites are all crops, including those grown in greenhouses, nursery and outdoor beds for mushroom casing soil, potato storage houses (empty), potting soil, celery seedbeds (Florida), seed flats, tobacco beds (GS-0040-031)*, grain elevators, grain warehouses, feed mills, wheat (grain), barley (grain), oats (grain), rye (grain), milo (grain), corn (grain), rice (grain), beans, cowpeas, peas, strawberries, tomatoes, floral crops, onions, eggplant, cucumbers, melons, yams, sweet potatoes, nursery crops, tree fruits (GS-0040-031)*, lawns (GS-0040-031)*, turf (GS-0040-031)*, Douglas fir, utility poles, pilings and similar large timber, burrows, seed corn dryers, seed storage buildings, other buildings, rooms, closets, homes, vaults, buckwheat (grain), debris piles, garbage dumps, and other outside vegetable and floricultural seed beds (GS-0040-029, GS-0040-030, GS-0040-032, GS-0040-033).

Pesticide Characteristics

Chloropicrin is a nonselective soil fumigant effective in controlling weed and grass seeds, many insects, certain fungal and bacterial plant pathogens, as well as repelling or killing rodents and burrowing animals. It can be sprayed on the surface of soils and into burrows for rodents, applied by chisels or plow sole applicators for field applications or poured over an absorbent material for closed-space fumigation. Control is enhanced when a tarpaulin is used in field applications and the amount of chemical required for adequate control can be reduced. Field applications must be smoothed and cultipacked immediately behind the chisels. Soil should be moist during application to ensure adequate control. Chloropicrin is used directly from the container. The liquid is non-flammable and can be detected at very low concentrations. Chloropicrin stores well in tightly sealed containers and should be kept in cool, well ventilated areas away from the home. Chloropicrin may be corrosive under certain conditions. Do not use magnesium, aluminum or their alloys for handling equipment or containers (GS-0040-029, GS-0040-030, GS-0040-032, GS-0040-033).

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*These uses are not identified on registered labels.

2. Usage Information by Site

The 1979 estimates of usage are given in Table 1.

B. Environmental Fate Profile

The submitted data are insufficient to fully assess the environmental fate of chloropicrin.

Chloropicrin in air is photodegraded fairly rapidly under simulatd sunlight conditions, having a half-life of 20 days. Photoproducts formed include nitrosyl chloride (NOCl), phosgene ($COCl_2$), nitrous oxide (NO), and Cl_2 (Moilanen et al., 05007865).

Chloropicrin appears to affect the nitrogen cycle in soil by inhibiting the conversion of NH_4^+ to NO_2^- and NO_3^- (nitrification), thus causing an accumulation of NH_4^+. Chloropicrin at 200 lb/A or more inhibits nitrification in soil, whereas at 70 lb/A or less, it has no effect on nitrification (Winfree and Cox, 05015851; Tam, 05014135; Innis, Speiden and Co., 00013185; Rovira, 05014996; Ridge, 05015228; Rovira and Ridge, 05021433; Aldrich and Martin, 05014013; Overman, 05017064; Elliot et al., 05014198). Chloropicrin at 640 lb/A or less either stimulates or has no effect on the ammonification process in soil (Winfree and Cox, 05015851; Innis, Speiden and Co., 00013185; Simon-Sylvestre, 05015335; Elliot et al., 05014198). Several soil microorganisms (i.e., aerobic bacteria, fungi, yeasts, cellulolytic bacteria, and proteolytic bacteria) are inhibited by chloropicrin; however, aerobic bacterial populations recover 2-6 weeks following treatment (Ladd et al., 05014906; Rovira, 5014996, Ridge, 05015228; Rovira and Ridge, 05021433; Reber, 05018693; Overman, 05017064; Simon-Sylvestre, 05015335; Mankau, 05014434; McCalla et al., 05014331; Bertrand and Rosenblatt, 05017016; Morgan, 05015845).

Chloropicrin adsorbs more readily to clay particles than to sand particles (no Freundlich constants were reported). Soil pH and organic matter content are unimportant factors in chloropicrin adsorption (Stark, 05018301).

C. Exposure Profile

Data are not available to fully assess the potential for exposure of humans and wildlife to chloropicrin. The information needed includes: bioaccumulation data and octanol/water partition coefficient;

volatility data that would indicate potential inhalation exposure; and field dissipation and leaching data that would indicate potential groundwater contamination.

Fumigants, including chloropicrin, have the common property of being in the gaseous form at the time they exert their pesticidal action (Casarett and Doull, 1975, GS-0040-05); therefore, the dissipation of chloropicrin is probably attributable primarily to volatilization. However, only one leaching study and no volatility data are available; therefore, it cannot be determined whether chloropicrin moves into the soil profile or volatilizes to the air.

Available data show that chloropicrin is photodegraded fairly rapidly in air (half-life = 20 days) under simulated sunlight conditions, which would indicate that chloropicrin would not persist when exposed to sunlight as a result of volatilization (05007865). This is supported by data showing that soil-dwelling aerobic bacteria, which were initially inhibited by chloropicrin, recovered 2-6 weeks post-treatment (05014906; 05015228; 05021433; 05018693; 05017064; 05015335; 05014434; 05014331; 05017016; 05015845; and 05014996).

High doses of chloropicrin are applied in the field (150-1,076 lb/A) and to enclosed areas (0.25-2.5 lb/1,000 ft^3) such as vaults, homes, and warehouses. Data are not available to assess such exposures. However, a respirator must be worn during mixing and loading. The potential for exposure during fumigation of enclosed areas is high. Accordingly, applicators must wear a respirator during application and before the reentry interval has expired.

D. Summary of Major Data Gaps

The major data gaps for this chemical are: hydrolysis studies, aerobic and anerobic soil metabolism, leaching, laboratory volatility, and reentry data.

The following data have been deferred pending receipt and review of the above discussed data. These data are field volatility studies, terrestrial field and long-term field dissipation studies, fish accumulation studies, and field studies of accumulation in non-target aquatic organisms.

The requirement for the submission of the following data is currently being reserved pending the review and modification of the testing protocols. These are effects of microbes on pesticides, effects of pesticides on microbes, and activated sludge metabolism.

E. Label Restrictions

For MUP's the label must require a full-face gas mask approved by NIOSH/MSHA. A standard precautionary warning to avoid contact must be on the label as well.

TABLE 1
Domestic Usage of Chloropicrin as a Pesticide (1979)(3)

Sites	Approximate Quantity of A.I.		Pct. of Site Treated Per Year	Regional/States Usage Info.
	Pounds (000)	Percent		
Agricultural				
Major Sites				
Tobacco	2,990	26	20	East/Southeast
Fruits	2,880	25	N/A	CA, TX, FL
Tomatoes	1,495	13	N/A	FL
Other Veg.	1,495	13	N/A	N/A
Total:	8,860	77		
Industrial/commercial:				
Major sites				
Commodity, Space, and Structural	1,150	10	N/A	Midwest, South
Floral, Lawns and Ornamental	920	8	N/A	N/A
Misc. Soil Fumigation	460	4	N/A	N/A
Industrial and Institutional	115	1	N/A	N/A
Total:	2,645	23		
Grand Total:	11,505	100		

Note: N/A means data not readily available.

RESIDUE CHEMISTRY

A. Use Patterns
B. Nature of the Residue (in plants and animals)
C. Analytical Methodology
D. Residue Data
E. Residue Reassessment
F. Regulatory Incidents
G. Labeling Requirements
H. Summary of Data Gaps

A. Use Patterns

Chloropicrin is a non-selective soil, space and stored commodity fumigant which is used at both agricultural and domestic sites. It may be used alone or in mixtures with methyl bromide or other fumigants. It is also sometimes used in small amounts as a warning agent in space fumigants.

It is said to be effective in the control of weeds, nematodes, certain fungi, insects, and rodents.

Use patterns for chloropicrin and its mixtures have been grouped into the following sites:

1. "All crops" (including nursery, greenhouse, and seed beds), as preplant soil fumigants.

2. Stored grains, as post-harvest stored commodity fumigants.

3. Closed areas: potato storage houses (empty), grain elevators, grain warehouses, feed mills, seed storage and other buildings, homes, rooms, closets, vaults, boxcars and ships -- as space fumigants.

4. Wood (Douglas fir, utility poles, pilings, other large timber) as preservatives.

5. Debris and garbage dumps, rodent burrows including mulching straw, hay, compost and manure, as insecticides and rodenticides.

6. (A 24c registration on meat -- cured ham, bacon and sausage -- as a stored commodity fumigant was withdrawn because there were no established tolerances.)

According to information received in RCB, the application rates are as follows for preplant soil fumigation:

Site	Application rate (chloropicrin)
All crops (including greenhouse nursery and outside beds)	485-1076 lb/A 150-200 lb/A
Greenhouse beds	3-4 cc/cu. ft.
Mushroom casing soil	5-10 cc/cu. ft.
Celery seedbed (Florida)	3-6 cc/sq. ft. (2 gal/4' x 300' bed)
Seedbeds (other)	3-4 cc/sq. ft.
Seed flats	2-4 cc/sq. ft. or 10 cc/cu. ft.
Strawberry cropland	320-500 lb/A (3 cc/sq. ft.; 35 gals./A)
Replant strawberries Southern LA only	150-200 lb/A
Tomatoes	300-500 lb/A
Nursery crops	500 lb/A
Onions	200-400 lb/A
Eggplant beds	300-500 lb/A
Cucumbers	300-500 lb/A
Melons	300-500 lb/A

Site	Application rate (chloropicrin)
Sweet potatoes	150-400 lb/A
Yams	150-400 lb/A

- for postharvest fumigation:

Site	Application rate (chloropicrin)
Clean dry grain:	
Wheat, barley	2 1/2 lb/1000 bu.
Oats	3 1/2 lb/1000 bu.
Corn	3 1/2 lb/1000 bu.
Sorghum (milo)	4 1/2 lb/1000 bu.

- for space fumigation:

Site	Application rate (chloropicrin)
Vaults, warehouses	1 1/2 lb - 3 lb/1000 cu. ft.
Bees, nests	2 lbs/1000 cu. ft. of incubator space.

The fumigants are applied by soil chisel or plow sole applicators, hand injectors, hand sprayers, or by pouring over an absorbent material for closed-spaced fumigation, or by means of a pressurized aerosol "bomb." Field applications must be smoothed and cultipacked immediately behind the chisels. Soil has to be moist during application to ensure adequate control. Field soil application rates may be lowered by use of a tarpaulin with water seal for 24 hours to prevent premature escape of the gas. A one- to two-week aeration period before planting crops is recommended. Sealing for 12 to 72 hours is required when used in buildings, then ventilating for 12 to 24 hours before entry.

Nearly 90% of annual use is as a preplant soil fumigant for tobacco beds, tree fruits, tomatoes and other vegetables, field crops, nurseries, lawns, turf and ornamentals.

B. Nature of the Residue in Plants and Animals

It was previously concluded that the residue consisted of chloropicrin alone, that it was retained by fumigated commodities but rapidly dissipated by aeration (GS-0040-011). In the present view, there is a possibility of other substances being present as components of the residue. It has been suggested "that chloropicrin is a reactive compound and will oxidize, chlorinate, or nitrate another compound depending upon conditions and the nature of the other compounds. Chloropicrin combines quantitatively with the free sulfhydryl groups of enzymes and proteins" (W. B. Rankin, memo of conference, GS-0040-011). Therefore, information is needed on the breakdown of chloropicrin in fumigated commodities, and, because many of these can be eaten by food-producing animals, in the latter as well.

This problem is acute for stored commodity fumigation, but may be alleviated for preplant soil fumigation by the aeration period and the preplant and growing intervals of the crop. In the latter case, it has been assumed that the residue in the soil was beyond reach of the plant. This is reflected in the footnote to 40 CFR 180.199 (GS-0040-037) on tolerances for residues resulting from soil treatment with combinations of chloropicrin, methyl bromide and propargyl bromide, e.g.:

> No tolerances are established for chloropicrin since it has been established that no residue of this substance remains in the raw agricultural commodity.

Data must be submitted on the nature of the residue in representative food and feed crops from both preplant soil fumigation and postharvest grain fumigation. Metabolism data on three crops that are representative of each of three different crop groupings (preplant soil fumigation) may be acceptable. (If metabolic paths differ significantly, data representative of more groups will be needed.) Data on wheat (postharvest grain fumigation) will be sufficient. If detectable residues of chloropicrin and/or its metabolites are found in feedstuffs, data will be needed on the metabolism in food animals (cow and hen).

C. Analytical Methodology

Dow Chemical Company analytical method (1957, 000012916) similar to that of Feinsilver and Oberst (1953, 05014119) was used to obtain the existing residue data. According to this method, the chloropicrin is steam-distilled from an acidified mixture of sample and water. The distillate is decomposed to nitrite which is coupled with Bratton-Marshall reagents and determined colorimetrically, using water as a reference. With strawberries and potatoes, the limit of sensitivity was said to be 0.1 ppm. The method was acceptable for the determination of residues in connection with an exemption but might now be considered obsolete.

A recent submission by Stoner (1979, 000022930) mentions a GLC/EC method using an isooctane/acetonitrile partitioning for nuts, dried fruit and dried peas which reliably detects levels of chloropicrin at 0.05 ppm and above, 0.01 ppm being the lowest level detectable. (No other details were given, and the submission could not be related to any residue data.)

A GC/EC method for analyzing chloropicrin in wine is described in the papers by Revuelta (1975; 05017475) and Merck-Luengo (1971; 05017924). Recoveries ranged from 80-100% depending on the origin of the wine and number of peaks obtained, the latter indicating interference.

The GLC technique is apparently available for determining residues in food commodities, but none has been adapted specifically for that purpose.

D. Residue Data

The colorimetric method of Feinsilver and Oberst (1953, 05014119), modified by Dow or by the FDA, was used to obtain the following residue data:

Residues from preplant soil application

Studies were submitted by Dow for strawberries (1959, 000013061) grown in treated soil in Ohio and California and, because tuber and root groups are considered most vulnerable to chloropicrin, for white and sweet potatoes grown in treated soil in California (1956 and 1957; 000013060). Applications were at maxima of 480 lbs/A for strawberries, 210 lbs/A for white potatoes and 315 lbs/A for sweet potatoes, with a preplant aeration period of 2-3 weeks.

Residues (if any) of chloropicrin were reported to be below 0.5 ppm, the limit of method sensitivity. At this level, there was no difference between samplings from treated and untreated plots.

Since the present maximum allowable dosage rate on "all crops" is 1076 lbs/A and the minimum preplant aeration period is 7 days, it is concluded that there is a data gap in support of the preplant soil application of chloropicrin on "all crops." Residue data must be submitted according to accepted protocols that adequately reflect current analytical methdology, maximum application rate, aeration period and minimum pre-plant and growing intervals. Reference may be made to 40 CFR 180.34 (GS-0040-028) for representative crop groupings.

Postharvest grain fumigation

International Minerals and Chemical Corporation (IMC) and FDA (GS-0040-011) collaborated in determining residues on samples of fumigated wheat provided by IMC. Chloropicrin at 99% and 97% purity was used in an application range of 2-5 lbs/1000 bu. IMC showed a maximum residue of 4 ppm sampled at 3-5 days after fumigation at 3X the recommended rate. Cleaning and tempering lowered the residue to 1 ppm; milled flour had 0.5 ppm and other milled fractions (bran, shorts, germ) had 2 ppm. Blanks were erratic: 0.3 to 1.3 ppm; no validation data was included. Fumigation at the recommended (1X) rate resulted in a maximum residue of 1 ppm and correspondingly less in the milled fractions. FDA obtained uncorrected values similar to, but slightly lower than, those of IMC. A validation study made by FDA indicated recoveries of 60-80% at levels of 0.5 and 5.0 ppm. The limit of sensitivity was declared to be 0.5 pm, not 0.1 ppm as claimed initially by Feinsilver and Oberst (1953, 05014119) and by IMC.

In 1965, Getzendaner et al. (05014591) reported the results of their residue determinations on various food commodities fumigated at Dow and the Morton Chemical Company. These were as follows for the highest application rates, as noted.

Commodity	Rate lbs/1000 cu ft	Residues as ppm chloropicrin found after # days aeration (except where noted)	
		(1)-----days	------(30)
flour	4	50-55	8-9
flour	1 1/2	3.4-3.9--(2 days)	0.4-1.4
wheaties	4	15-22	1-2
wheaties	1 1/2	1.6-1.7--(1 day)	0.1-0.3
beans (dry)	4	2.4-3.0	0.8-1.0
peas (dry)	4	0.5-1.0	1.8
corn (field)	4	11-14	3
broiler feed	4	94-99	15-16

(1 bushel = 1.24 cu ft)

The validation data indicate recoveries of 87-95% for these commodities (except 65% broiler feed). The method sensitivity was said to be 0.5 ppm.

The effect of baking was also shown. Biscuits made from flour (treated at 4 lbs/1000 cu ft, not aerated) containing 146-147 ppm chloropicrin, showed net residues of 3.9-6.7 ppm and 26-28 ppm. However, biscuits made from flour (treated at 1 1/2 lb/1000 cu ft, aerated 2 days) containing 3.7 ppm chloropicrin, showed no net residue. A substantial reduction of residue was observed under exaggerated conditions of treatment, but some still remained. Under more normal conditions, almost all of the residue is expected to dissipate.

In a separate internal FDA study, less than 0.1 ppm was found in bread baked from flour to which 25 ppm chloropicrin was added.

In the mid-60's, the Morton Chemical Company proposed, without mentioning numerical tolerance or exemption, the clearance for residues of chloropicrin from its use in fumigating "dry processed foods," but the petition was withdrawn. An FDA memo noted the lack of data from commercial fumigation and stated that data for four other fumigants showed commercial fumigation resulted in residues that were five times higher than those found in pilot plant studies (possibly from lower temperatures and less aeration) (GS-0040-015).

At that time, Dow petitioned that the exemption for grains be extended to include dried beans and peas. This petition was also withdrawn, but not before the evaluation was completed. Residues of chloropicrin were estimated to be 2-4 ppm after fumigation and aeration, and of 1-2 ppm or less after washing, soaking, and cooking.

It is concluded that a data gap exists for supporting a continuing exemption of the following 8 grains from the requirements of a tolerance for chloropicrin residues as a result of postharvest fumigation: barley, buckwheat, corn, oats, rice, rye, sorghum, and wheat. Data must be submitted, according to accepted protocols using current analytical methodology, that show the true level of residues with greater assurance than that given here.

Other Considerations

A number of use sites previously designated as non-food uses, are actually food uses, or near-food uses with possibilities for food contamination (e.g., grain elevators and warehouses, feed mills, seed storage and other buildings, homes). There are no data to indicate the presence or absence of residues in foods or feeds from these uses. There are no data on the residues in commodities other than grains that may be fumigated, e.g., cured meat, tobacco and hay. The last is one of a number of fumigated commodities (e.g., grains and their mill fractions) which may be fed to food-producing animals. If the required studies show that residues remain in crops and commodities after either preplant soil fumigation or stored commodity fumigation, then appropriate feeding studies, following accepted protocols, must be submitted to show whether or not residues are transferred to meat and milk.

E. Residue Reassessment

Because there are no established tolerances, there can be no tolerance reassessment. Instead, an attempt to reassess the nature and amount of the residue and the appropriateness of the exemption from the requirement of a tolerance has been made.

The exemptions (40 CFR 180.1008)[1], were granted on the grounds that residues would not persist in foods made ready-to-eat. An alternative offered at the time was a tolerance of 5 ppm for residues of chloropicrin in the eight grains (GS-0040-011). The decision as to whether or not the existing exemption is maintained, or a tolerance established instead, must be based on toxicological considerations.

In any case, the available data do not indicate the nature and amount of residue with the degree of assurance needed by present-day standards for either an exemption or a tolerance. In addition, the question of feeding treated commodities to food-producing animals seems never to have been considered.

Likewise, registrations seem to have been granted for all crops on the basis of no residues expected from preplant soil fumigation. The support for this finding involves only three crops and methodology sensitive to only 0.5 ppm. Here also, the available data do not adequately indicate the nature and amount of residue from the wide use of this fumigant.

Therefore, it is not possible at this time to reassess precisely the nature and amount of residue present in food and feed from established uses of chloropicrin. No other regulatory or administrative guidelines are pending. There is no listing for Canada, Mexico or the Codex Alimentarius Commission.

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[1] 40 CFR 180.1008 is as follows: "The insecticide chloropicrin is exempted from the requirement of a tolerance for residues when used as a fumigant after harvest for the following grains: barley, buckwheat, corn (including popcorn), oats, rice, rye, grain sorghum, wheat."

F. Regulatory Incidents

FDA reports no enforcement actions on chloropicrin. (This would have to be a special project, as chloropicrin is not routinely tested for.)

Monitoring studies based on an acceptable regulatory method are suggested for a representative sampling of commercially fumigated stored food commodities.

G. Required Labeling

All technical and manufacturing use products containing chloropicrin must bear appropriate labeling as specified in 40 CFR 162.10. This guidance package contains specific information regarding label requirements. The following statements must appear on all labels:

STATEMENT OF PRACTICAL TREATMENT (Front panel, below ingredient statement)

If inhaled- Remove victim to fresh air immediately. Keep victim lying down and warm. Give artificial respiration if breathing has stopped. Call physician immediately.

If on skin- Remove all contaminated clothing and shoes immediately. Wash exposed areas thoroughly with soap and water. If a rash or blister develops, get medical attention. Clean or launder contaminated clothing before re-use. Do not re-use clothing or shoes until completely free of chemical odor.

If in eyes- Flush with running water for at least 15 minutes. Get medical attention promptly.

PRECAUTIONARY STATEMENTS (side panel)
HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Danger:- Poisonous liquid and vapor. Contact with liquid may produce burns. Do not breath vapor. Do not get in eyes, on skin, or clothing. Wash all contaminated clothing with soap and water before re-use. Do not re-use contaminated clothing or shoes until free of chemical odor.

H. Summary of Data Gaps

The Agency requires the following data: Nature of the residue in plants and livestocks; residues in raw agricultural commodities and fumigated grains; and analytical methods to determine these residues. (Storage stability data will be needed only if samples are not analyzed promptly.)

If residues are found in raw agricultural commodities and fumigated grains, then residue data will be required on processed food, meat, milk, poultry, and eggs. Analytical methods to determine these residues would also be required.

ECOLOGICAL EFFECTS

A. Ecological Effects Profile
B. Hazard Assessment
C. Summary of Data Gaps

A. Ecological Effects Profile

There are two acceptable studies on the ecological effects of chloropicrin. They show 96-hour LC_{50} values for technical chloropicrin to rainbow trout (Salmo gairdneri; U.S. EPA, 1971, GS-0040-16) and bluegill (Lepomis macrochirus; U.S. EPA, 1972, GS-0040-17) to be in the very highly toxic range, 16.5 and 105.0 ppb respectively. These studies satisfy EPA Guideline requirements for establishing the acute toxicity of technical chloropicrin to freshwater cold- and warm-water fish species. No data were submitted which were considered acceptable to characterize chloropicrin toxicity to other non-target animal groups.

B. Hazard Assessment

Little hazard to non-target organisms is expected for most if not all uses of chloropicrin. The practice of flooding or covering with a tarpaulin or plastic following injection is believed to minimize exposure to terrestrial vertebrates in adjacent areas so that no adverse population effects will result. One reservation lies with the outdoor soil injection use. Given the high application rates (1076 lb a.i./A) and the solubility of chloropicrin in water, we speculate that there is a possibility of groundwater contamination. Although no hazard assessment was conducted at this time, the available data will be used to assess effects, should any future environmental problem come to our attention.

C. Summary of Data Gaps

A data gap exists for the MUP of chloropicrin for acute toxicity to aquatic invertebrates.

TOXICOLOGY

A. Toxicology Profile
  1. Overall Profile
  2. Toxicity Studies

B. Hazard Assessment
  1. Applicators
    a. Overall
    b. Soil Injection
    c. Commodity, Equipment and Premise Fumigation
    d. Burrow Applications
    e. Reentry
  2. Case Reports
  3. Tolerances

C. Summary Toxicology Data Gaps

A. Toxicology Profile.

1. Overall. Chloropicrin (CP) is a highly toxic liquid, the vapors of which are used as a fumigant for fungicidal, herbicidal, nematocidal, insecticidal and rodenticidal purposes. The only toxicological data available for the Agency review were acute, oral, dermal and inhalation studies. The review of these studies indicate that the chemical chloropicrin is highly toxic and meets the criteria for classification under Toxicity Category I. The acute toxicity data requirements for eye and skin irritations, dermal sensitization and delayed neurotoxicity are waived for technical and manufacturing use products because repeated direct exposures to chloropicrin products are not expected due to the use of protective equipment and clothing. In addition, the subchronic and chronic data are deferred until additional residue, hyrolysis, aerobic and anaerobic soil metabolism and mobility data are submitted and reviewed. If chronic exposure is demonstrated in these studies, chronic toxicity data may be required.

2. Toxicity Studies.

ACUTE ORAL TOXICITY: (163.81-1) A rat study (Harton and Hawl, 1976, 5014376) using a technical chemical demonstrated that CP produced an LD50 of 37.5 mg/kg placing the technical product in Toxicity Category I for acute oral toxicity. Acute oral toxicity studies on the MUP were not available but are being waived, since the Agency has determined by extrapolation that its toxicity is substantially similar to the technical chemical.

ACUTE DERMAL TOXICITY: (163.81-2) One acute dermal toxicity study (Harton and Rawl, 1976, 5014376) indicated dermal LD_{50} of 100 mg/kg, a Toxicity Category I.

ACUTE INHALATION TOXICITY: (163.81-3) Of several studies, only one (Harton and Rawl, 1976, 5014376) met requirements for toxicity testing which indicated an LC_{50} of 25.5 ppm or 0.178 mg/L for technical CP, a Toxicity Category I. Acute inhalation tests using MUP formulations are being waived since the Agency has determined by extrapolation that its toxicity is substantially similar to the technical chemical.

PRIMARY EYE IRRITATION: (163.81-4) No studies were submitted and none are being required because repeated exposure to chloropicrin is not expected based on the requirement for protective equipment and clothing.

PRIMARY DERMAL IRRITATION: (163.81-5) None were submitted and none are being required because the labels require that repeated dermal exposure must be avoided. This study would further be negated since chloropicrin is highly volatile and only limited dermal exposure would be expected.

DERMAL SENSITIZATION: (163.81-6) None were submitted and none are being required because the labels require that repeated dermal exposure must be avoided.

DELAYED NEUROTOXICITY: (163.81-7) None were submitted and none are being required because the labels require that repeated dermal exposure must be avoided. The basis for requiring delayed neurotoxicity studies, namely, detection of acute neurological effects or anticipated repeated exposure, has not been established. Therefore, additional studies will not be required.

SUBCHRONIC AND CHRONIC ORAL TOXICITY: (163.82-1 and 163.83-1) None were submitted and none are being required at this time. These have been deferred until additional residue, hydrolysis, aerobic and anaerobic soil metabolism and mobility studies are provided.

SUBCHRONIC 21-DAY DERMAL TOXICITY: (163.82-2) None were submitted and none are being required at this time. These have been deferred until additional residue, hydrolysis, aerobic and anaerobic soil metabolism and mobility studies are provided.

SUBCHRONIC 90-DAY DERMAL TOXICITY: (163.82-3) None were submitted and none are being required at this time. These have been deferred until additional residue, hydrolysis, aerobic and anaerobic soil metabolism and mobility studies are provided.

SUBCHRONIC INHALATION TOXICITY: (163.82-4) None were submitted and none are being required at this time. These have been deferred until additional residue, hydrolysis, aerobic and anaerobic soil metabolism and mobility studies are provided.

CHRONIC FEEDING STUDIES AND ONCOGENICITY: (163.83-2) One study (National Cancer Institute, 1978, 05014915) was submitted and the results were negative. However, this study did not meet minimum standards for validation acceptance by the Agency because the mortality of the animals was high. No other studies will be required at this time. These have been deferred until additional residue, hydrolysis, aerobic and anaerobic soil metabolism and mobility studies are provided.

TERATOLOGY: (163.83-3) None were submitted and none are being required at this time. These have been deferred until additional residue, hydrolysis, aerobic and anaerobic soil metabolism and mobility studies are provided.

REPRODUCTION: (163.83-4) None were submitted and none are being required at this time. These have been deferred until additional residue, hydrolysis, aerobic and anaerobic soil metabolism and mobility studies are provided.

MUTAGENICITY: (163.84-2 to - 4) None were submitted and none are being required at this time. These have been deferred until additional residue, hydrolysis, aerobic and anaerobic soil metabolism and mobility studies are provided.

METABOLISM: (163.85-1) None were submitted and none are being required at this time. These have been deferred until additional residue, hydrolysis, aerobic and anaerobic soil metabolism and mobility studies are provided.

B. Hazard Assessment.

1. Applicators.

Overall. Liquid formulations are applied outdoors to fields, orchards, and forest areas with injecting devices such as plow soles and chisels using mechanical equipment (tractors) and sealing the soils with rollers or cultipacking devices. CP can be applied to small plots or seed beds by hand injectors. Soils thus treated are to be covered with water or impervious covers (such as plastic tarpaulins) to contain the vapor. CP liquid may also be applied to grain while the grain is being loaded for transport or storage. Bagged commodities, empty storage structures (from warehouses, vaults, bins, etc.) and dwellings are fumigated by exposing sealed storage sites and allowing the CP to evaporate from cloth-like materials placed in pans in or near the items being fumigated.

Applicators are to avoid direct contact with CP during application. Treated soils, commodities and structures are to be adequately aerated after appropriate fumigation periods. Reentry without protective equipment should be allowed only after vapor levels are reduced to allowable limits as measured by field methods. Environmental site dissipation data have not been provided nor have routine field monitoring methods been recommended. Such data and methods need to be develped in order to establish safe reentry conditions.

Soil injection. This is accomplished using ready to use liquids, pressurized liquids or pressurized gas formulations. Outdoor applications generally are accomplished through the use of mechanical equipment such as chisels and plow soles attached to tractors. Small soil beds may be injected using hand held injectors. The injected soil must be sealed by tamping the soil using such devices as cultipackers or rollers, wetting the top layer of soil and/or it may be covered using polyethylene plastic tarpaulins or the like. Toxic exposures have been reported from loading the pesticide into application devices, equipment failures (fittings and hose leaks), spills, especially when cleaning devices and exposures when applying or removing the plastic covers or tarpaulins (GS-0040-025). Vapors rising from the treated soils or drifting from the application site to areas of habitation have also been reported as exposure problems. Thus applicators are not to apply the fumigants at night, during inversions and when there is no air movement in order to reduce the possibility of applicator exposure. Further, the applicator needs to assure that application sites will not be too near areas of inhabitation and the topography will be such that the escaping heavy vapors or gases will cause human injury.

Fumigation of commodity, equipment and premises. Bulk commodity fumigation of grains can be accomplished by adding liquid fumigant to the grain while it is being loaded into storage sites (vaults, bins and the like) or transport sites (boxcars, ships and the like). This is usually accomplished by automatic metering devices. The operator needs to insure that the storage site is structurally intact so that it will contain the fumigant vapors.

Bagged commodities (grains, soils, etc.) are fumigated either by allowing liquid fumigant to evaporate from porous materials (rags in pans) placed near the commodities or by injecting gaseous fumigant under plastic covers which are used to contain the fumigants next to the commodities.

Equipments and structures to be fumigated must be sealed as airtight as possible and then fumigated with vapors from vaporating formulations or fumigated by the injection of gaseous formulations into the contained area. Care must be exercised to avoid any contact with the fumigant by any foods, food equipment, plants, animals and numerous items which may be adversely affected. Structural wooden areas under the ground can be fumigated by injecting the fumigants into the ground near the wooden structures and sealing the soil to contain the vapors.

Burrow Applications. Burrows of rats, squirrels, snakes and the like are fumigated by stuffing rags soaked with the liquid formulations into the burrows and sealing the burrows. Care should be exercised to insure that the vapors will not escape from the treated burrows into inhabited areas.

Reentry. Reentry concerns involve identifying conditions under which the applicator and other individuals may safely reenter a treated site. Allowable reentry can be based on standardized aeration periods (reentry intervals) or on allowable reentry levels. Since CP and CP mixtures are used in a wide variety of application sites and because site conditions can vary considerably (due to different humidity, wind conditions, temperature, aeration efficiency, etc.), the use of allowable reentry levels provides a better safety and flexibility for specific site conditions. Many of the labels examined have little or no information on precautions for reentry.

From the case studies, applicators and non-applicator personnel have been adversely exposed to CP (and/or co-fumigants used with CP) under accidental entry, intentional entry without protective equipment and under conditions which were assumed to be safe based on following the labeling directions. Thus there is a need to establish allowable reentry conditions.

Reentry Intervals. Based on Index entries, a number of standard reentry intervals have been used: 2-week aeration of treated soils; 12- to 24-hour post-treatment aeration periods for dwellings, bagged materials, storage or transport containers. However, data are not available to support these reentry intervals. Studies to obtain such information are being requested by Environmental Fate Branch (Enviro Control, 1981, GS-0040-002).

Permissible Reentry Levels. As in the case of other fumigants (aluminum phosphide, magnesium phosphide), the application site can be aerated until the atmospheric level of CP is at the OSHA occupational Permissible Exposure Level (PEL). This is currently set at 0.1 ppm or 0.7 mg/cu.m. According to the documentation on this standard, 0.1 ppm level is based on the painful eye irritation which resulted from exposure of 0.3 to 0.37 ppm for 3 to 30 seconds (OSHA/NIOSH, 1981). This is based on acute toxicity instead of a chronic or subchronic NOEL. We do not have an adequate subchronic or chronic NOEL for inhalation of CP on which to base an allowable reentry level. It is possible that with proper post-fumigation aeration of the application sites, the levels of CP (and their co-fumigants) will rapidly be reduced to insignificant levels. The Agency will defer a decision on requiring further toxicity studies until after the registrants have an opportunity to provide dissipations studies being requested by Environmental Fate Branch.

Field Monitoring Methods. It is necessary to have a rapid, direct field method for determining CP at the application site if reentry is to be based on the PEL. OSHA did not recommend a field method (OSHA/NIOSH, 1981); however, the methods discussed by Monro (1969, GS-0040-036) or some of the air sampling methods commercially available (halides tubes) may be suitable.

2. Case Reports.

Because of its extreme toxicity and its irritating effects on the eyes, lungs and mucous membranes, CP was used as a war gas for World War I and therefore there is a considerable history of its acute effects on humans. Articles such as Poirier, J., (1927, 05019755) and Underhill (1919, 00013191 and 05019986), reviwed the toxic effectiveness of CP as a war gas.

The August 1979 Pesticide Incident Monitoring System Report (PIMS, 1979; GS-0040-024) provided a tabulated summary of the reported pesticide incidents involving CP and fumigant mixtures containing CP. As summarized in this report, sixteen reported incidents involved humans and CP alone; of these there was one fatality and no hospitalizations; 22 individuals received medical attention and five were affected but did not receive medical attention. CP in combination with other ingredients and humans were involved in 86 reported incidents; three humans were fatalities, 35 were hospitalized, 84 received medical attention, and approximately 100 were affected.

There were significant numbers of exposures due to container failures (7), equipment failures (16), improper procedures (9) and accidental contact with the pesticide (59). Accidental contact included contact with the pesticide during loading operations, cleaning and maintaining equipment used for pesticide application, equipment failure (especially hoses bursting) and reentry (removing tarpaulins).

It may be necessary to attempt to classify the episodes by the individual pesticides involved, especially in the case of equipment failures where the corrosive properties of the agents may have been a factor. CP only was involved in 16 episodes while as mixtures of CP and other agents, methyl bromide was involved in 60 episodes; the C3 chlorinated hydrocarbons, 20; ethylene dibromide, 7; and, sulfuryl fluoride, 2.

3. Tolerances.

Preplant soil treatments have been considered as non-food applications; however, neither soil dissipation studies nor residues in plants grown on such soils have been provided to support this decision.

The Index entries list tolerance exemptions for the uses of CP on several raw agricultural commodities: barley, corn (field), oats, rice, rye, sorghum, wheat and buckwheat. Grains treated with CP have been exempted from the requirement of tolerances because CP has not been found in grains which had been properly aerated after treatment. However, metabolism studies using radiolabeled tracers have not been carried out in order to ascertain if CP is converted to other chemicals. It is also possible that the residues studies should be repeated using more sensitive analytical methods. The Agency will need definitive studies on residues before it can further evaluate the acceptability of these tolerance exemptions for CP. Residues resulting from the co-fumigants in mixtures may also need to be investigated.

Index entries also list as "non-food" (NF) uses of CP for preplant soil fumigation for "all crops," for "transplant vegetables" and specifically for cucumbers, eggplant, melon, onions, strawberry, sweet potatoes, tomatoes and yams. The bases for the non-food designation was not obvious from the information provided by the RS literature search nor from the Branch's Caswell files (GS-0040-035). We seem to be lacking soil persistance studies for CP (Environ Control, 1981; see Environmental Fate Chapter V). Based on the expected reactivity of CP, and the fact that microbial activity returns to soils and the soils can be used for plants approximately 2 weeks after fumigation, we would expect no significant residues or uptake by plants grown in treated soils; however, the Agency will defer to Residue and Environmental Fate Studies for the need to further examine the question of possible significant residues from soils fumigated with CP. The NF designation for uses of mixtures of CP and other agents will also need to be considered before the Agency can evaluate possible hazards involved with the use of the mixtures.

C. Summary Toxicology Data Gaps.

There were a limited number of toxicological studies available from the literature or the Agency files. The categories of studies along with the data gaps are summarized in Tables A and B. None of the studies involved CP formulations (although there were a few studies not included in this standard which utilized formulations of CP mixtures).

The type of formulation or the purity of the CP used in the studies used in the table was not usually identified. It has been assumed that the data was obtained using either technical or pure CP as the test agent.

Acute Testing Requirements. The Agency has considered separately the toxicology requirements for technical and manufacturing-use formulations. Almost all of the products using CP are restricted either because of restrictions due to CP or because of restrictions due to the toxicity of the co-fumigants: By Classification-by-Regulation (FR 46:5696, January 19, 1981; GS-0040-026), all products containing more than 2% CP are restricted based on acute inhalation toxicity; all formulations for rodenticide uses based on hazard to non-target organisms; and all formulations 2% or less for outdoor use other than rodent control) are unclassified. The only mixtures of fumigants with 2% CP or less contain methyl bromide. By regulation (FR 43:5782, February 9, 1978; GS-0040-27), formulations of methyl bromide more than 1.5 # MeBr/container are restricted. Products with less than 1.5#/container without an indicator, are also restricted. Products (with indicators) with less than 1.5# MeBr/container are unrestricted for non-domestic, single application, soil treatment in closed systems; however, such products are not usually available to home owners (L. Bhattia, RD, personal communication; GS-0040-025).

On the basis of the above, it is possible to waive any further acute testing, providing the labeling is appropriately restrictive. If a registrant feels that this approach to labeling all CP-containing products is too severe, then the registrant should submit to the Agency the necessary acute testing data to justify relaxation of the labeling.

Subchronic and Chronic Testing Requirements. None of the studies provided for this review were adequate. In addition, there are currently data gaps for residues, soil degradation and site dissipation data for CP or its metabolic or conversion poducts. The need for and the identification of specific additional testing requirements will be deferred until these missing data are provided to the Agency.

Guide to Use of This Bibliography

1. CONTENT OF BIBLIOGRAPHY. This bibliography contains citations of all studies considered relevant by EPA in arriving at the positions and conclusions stated elsewhere in the Standard. Primary sources for studies in this bibliography have been the body of data submitted to EPA and its predecessor agencies in support of past regulatory decisions. Selections from other sources including the published literature, in those instances where they have been considered, will be included.

2. UNITS OF ENTRY. The unit of entry in this bibliography is called a "study." In the case of published materials, this corresponds closely to an article. In the case of unpublished materials submitted to the Agency, the Agency has sought to identify documents at a level parallel to the published article from within the typically larger volumes in which they were submitted. The resulting "studies" generally have a distinct title (or at least a single subject), can stand alone for purposes of review, and can be described with a conventional bibliographic citation. The Agency has attempted also to unite basic documents and commentaries upon them, treating them as a single study.

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4. FORM OF ENTRY. In addition to the Master Record Identifier (MRID), each entry consists of a citation containing standard elements followed, in the case of material submitted to EPA, by a description of the earliest known submission. Bibliographic conventions used reflect the standards of the American National Standards Institute (ANSI), expanded to provide for certain special needs.

a. Author. Whenever the Agency could confidently identify one, the Agency has chosen to show a personal author. When no individual was identified, the Agency has shown an identifiable laboratory or testing facility as author. As a last resort, the Agency has shown the first submitter as author.

b. Document Date. When the date appears as four digits with no question marks, the Agency took it directly from the document. When a four-digit date is followed by a question mark, the bibliographer deduced the date from evidence in the document. When the date appears as (19??), the Agency was unable to determine or estimate the date of the document.

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   (1) Submission Date. The date of the earliest known submission appears immediately following the word "received."

   (2) Administrative Number. The next element, immediately following the word "under," is the registration number, experimental use permit number, petition number, or other administrative number associated with the earliest known submission.

   (3) Submitter. The third element is the submitter, following the phrase "submitted by." When authorship is defaulted to the submitter, this element is omitted.

   (4) Volume Identification (Accession Numbers). The final element in the trailing parentheses identifies the EPA accession number of the volume in which the original submission of the study appears. The six-digit accession number follows the symbol "CDL," standing for "Company Data followed by an alphabetic suffix which shows the relative position of the study within the volume. For example, within accession number 123456, the first study would be 123456-A; the second, 123456-B; the 26th, 123456-Z; and the 27th, 123456-AA.

Chloropicrin

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Appendix IV-2(a)

OMB Approval No. 2000-0468 (Expires 12-31-83)

FIFRA SECTION 3(C)(2)(B) SUMMARY SHEET

EPA REGISTRATION NO.

PRODUCT NAME

APPLICANT'S NAME

DATE GUIDANCE DOCUMENT ISSUED

With respect to the requirement to submit "generic" data imposed by the FIFRA section 3(C)(2)(B) notice contained in the referenced Guidance Document, I am responding in the following manner:

☐ 1. I will submit data in a timely manner to satisfy the following requirements. If the test procedures I will use deviate from (or are not specified in) the Registration Guidelines or the Protocols contained in the Reports of Expert Groups to the Chemicals Group, OECD Chemicals Testing Programme, I enclose the protocols that I will use:

☐ 2. I have entered into an agreement with one or more other registrants under FIFRA section 3(C)(2)(B)(ii) to satisfy the following data requirements. The tests, and any required protocols, will be submitted to EPA by:

NAME OF OTHER REGISTRANT

☐ 3. I enclose a completed "Certification of Attempt to Enter Into an Agreement with Other Registrants for Development of Data" with respect to the following data requirements:

☐ 4. I request that you amend my registration by deleting the following uses (this option is not available to applicants for new products):

☐ 5. I request voluntary cancellation of the registration of this product. (This option is not available to applicants for new products.)

REGISTRANT'S AUTHORIZED REPRESENTATIVE

SIGNATURE

DATE

PA Form 8580-1 (10-82)

Appendix IV-3

OMB Approval No. 2000-0468 (Expires: 12-31-83)

CERTIFICATION OF ATTEMPT TO ENTER INTO AN AGREEMENT WITH OTHER REGISTRANTS FOR DEVELOPMENT OF DATA

(To qualify, certify ALL four items)

I am duly authorized to represent the following firm(s) who are subject to the requirements of a Notice under FIFRA Section 3(c)(2)(B) contained in a Guidance Document to submit data concerning the active ingredient:	**GUIDANCE DOCUMENT DATE** **ACTIVE INGREDIENT**
NAME OF FIRM	**EPA COMPANY NUMBER**

(This firm or group of firms is referred to below as "my firm".)

2. My firm is willing to develop and submit the data as required by that Notice, if necessary. However, my firm would prefer to enter into an agreement with one or more other registrants to develop jointly, or to share in the cost of developing, the following required items or data:

3. My firm has offered in writing to enter into such an agreement. Copies of the offers are attached. That offer was irrevocable and included an offer to be bound by an arbitration decision under FIFRA Section 3(c)(2)(B)(iii) if final agreement on all terms could not be reached otherwise. This offer was made to the following firm(s) on the following date(s):

NAME OF FIRM	DATE OF OFFER

However, none of those firm(s) accepted my offer.

4. My firm requests that EPA not suspend the registration(s) of my firm's product(s), if any of the firms named in paragraph (3) above have agreed to submit the data listed in paragraph (2) above in accordance with the Notice. I understand EPA will promptly inform me whether my firm must submit data to avoid suspension of its registration(s) under FIFRA Section 3(c)(2)(B). (This statement does not apply to applicants for new products.) I give EPA permission to disclose this statement upon request.

TYPED NAME	SIGNATURE	DATE

8580-6 (10-82)

APPENDIX VI-2

LABELING REQUIREMENTS OF THE FIFRA, AS AMENDED

ITEM	LABEL ELEMENT	APPLICABILITY OF REQUIREMENT	PLACEMENT ON LABEL		COMMENTS
			REQUIRED	PREFERRED	
1	Product name	All products	Front panel	Center front panel	
2	Company name and address	All products	None	Bottom front panel or end of label text	If registrant is not the producer, must be qualified by "Packed for . . .," "Distributed by. . .," etc.
3	Net contents	All products	None	Bottom front panel or end of label text	May be in metric units in addition to U.S. units
4	EPA Est. No.	All products	None	Front panel	Must be in similar type size and run parallel to other type.
5	EPA Reg. No.	All products	None	Front panel, immediately before or following Reg. No.	May appear on the container instead of the label.
6A	Ingredients statement	All products	Front panel	Immediately following product name	Text must run parallel with other text on the panel.
6B	Pounds/gallon statement	Liquid products where dosage given as lbs. ai/unit area	Front panel	Directly below the main ingredients statement	
7	Front panel precautionary statements	All products	Front panel		All front panel precautionary statements must be grouped together, preferably blocked.
7A	Keep Out of Reach of Children (Child hazard warning)	All products	Front panel	Above signal word	Note type size requirements.
7B	Signal word	All products	Front panel	Immediately below child hazard warning	Note type size requirements.

APPENDIX VI-2

LABELING REQUIREMENTS OF THE FIFRA, AS AMENDED

ITEM	LABEL ELEMENT	APPLICABILITY OF REQUIREMENT	PLACEMENT ON LABEL		COMMENTS
			REQUIRED	PREFERRED	
1	Product name	All products	Front panel	Center front panel	
2	Company name and address	All products	None	Bottom front panel or end of label text	If registrant is not the producer, must be qualified by "Packed for . . .," "Distributed by. . .," etc.
3	Net contents	All products	None	Bottom front panel or end of label text	May be in metric units in addition to U.S. units
4	EPA Est. No.	All products	None	Front panel	Must be in similar type size and run parallel to other type.
5	EPA Reg. No.	All products	None	Front panel, immediately before or following Reg. No.	May appear on the container instead of the label.
6A	Ingredients statement	All products	Front panel	Immediately following product name	Text must run parallel with other text on the panel.
6B	Pounds/gallon statement	Liquid products where dosage given as lbs. ai/unit area	Front panel	Directly below the main ingredients statement	
7	Front panel precautionary statements	All products	Front panel		All front panel precautionary statements must be grouped together, preferably blocked.
7A	Keep Out of Reach of Children (Child hazard warning)	All products	Front panel	Above signal word	Note type size requirements.
7B	Signal word	All products	Front panel	Immediately below child hazard warning	Note type size requirements.

ITEM	LABEL ELEMENT	APPLICABILITY OF REQUIREMENT	PLACEMENT ON LABEL		COMMENTS
			REQUIRED	PREFERRED	
7C	Skull & crossbones and word POISON (in red)	All products which are Category I based on oral, dermal, or inhalation toxicity	Front panel	Both in close proximity to signal word	
7D	Statement of practical treatment	All products in Categories I, II, and III	Category I: Front panel unless referral statement is used. Others: Grouped with side panel precautionary statements.	Front panel for all.	
7E	Referral statement	All products where precautionary labeling appears on other than front panel.	Front panel		
8	Side/back panel precautionary statements	All products	None	Top or side of back panel preceding directions for use	Must be grouped under the headings in 8A, 8B, and 8C; preferably blocked.
8A	Hazards to humans and domestic animals	All products in Categories I, II, and III	None	Same as above	Must be preceded by appropriate signal word.
8B	Environmental hazards	All products	None	Same as above	Environmental hazards include bee caution where applicable.

ITEM	LABEL ELEMENT	APPLICABILITY OF REQUIREMENT	PLACEMENT ON LABEL		COMMENTS
			REQUIRED	PREFERRED	
8C	Physical or chemical hazards	All pressurized products, others with flash points under 150°F	None	Same as above	
9A	Restricted block	All restricted products	Top center of front panel	Preferably blocked	Includes a statement of the terms of restriction. The words "RESTRICTED USE PESTICIDE" must be same type size as signal word.
9C	Misuse statement	All products	Immediately following statement of classification or ahead of directions for use		
10A	Re-entry statement	All cholinesterase inhibitors	In the directions for use	Immediately after misuse statement	
10C	Storage and disposal block	All products	In the directions for use	Immediately before specific directions for use or at the end of directions for use	Must be set apart and clearly distinguishable from from other directions for use.
10D U.S.	Directions for use	All products	None	None	May be in metric as well as U.S. units

Appendix VI-3

PHYSICAL-CHEMICAL HAZARDS

Criteria	Required Label Statement
I. Pressurized Containers	
A. Flashpoint at or below 20°F; or if there is a flashback at any valve opening.	Extremely flammable. Contents under pressure. Keep away from fire, sparks, and heated surfaces. Do not puncture or incinerate container. Exposure to temperatures above 130°F may cause bursting.
B. Flashpoint above 20°F and not over 80°F; or if the flame extension is more than 18 inches long at a distance of 6 inches from the valve opening.	Flammable. Contents under pressure. Keep away from heat, sparks, and flame. Do not puncture or incinerate container. Exposure to temperatures above 130°F may cause bursting.
C. ALL OTHER PRESSURIZED CONTAINERS	Contents under pressure. Do not use or store near heat or open flame. Do not puncture or incinerate container. Exposure to temperatures above 130°F may cause bursting.
II. Non-Pressurized Containers	
A. Flashpoint at or below 20°F.	Extremely flammable. Keep away from fire, sparks, and heated surfaces.
B. Flashpoint above 20°F and over 80°F.	Flammable. Keep away from heat and open flame.
C. Flashpoint over 80°F and not over 150°F.	Do not use or store near heat and open flame.
D. Flashpoint above 150°F.	None required.

STORAGE AND DISPOSAL INSTRUCTIONS FOR PESTICIDES

All products are required to bear specific label instructions about storage and disposal. Storage and disposal instructions must be grouped together in the directions for use portion of the label under the heading STORAGE AND DISPOSAL. Products intended solely for domestic use need not include the heading "STORAGE AND DISPOSAL." The STORAGE AND DISPOSAL heading must appear in the minimum type size listed below:

Size of label front panel in square inches	Required type size for the heading STORAGE AND DISPOSAL (all capitals)
10 and under	.6 point
Above 10 to 15	.8 point
Above 15 to 30	10 point
Over 30.	12 point

Storage and disposal instructions must be set apart and clearly distinguishable from other directions for use. Blocking storage and disposal statements with a solid line is suggested as a means of increasing their prominence.

A. Storage Instructions:

All product labels are required to have appropriate storage instructions. Specific storage instructions are not prescribed. Each registrant must develop his own storage instructions, considering, when applicable, the following factors:

1. Conditions of storage that might alter the composition or usefulness of the pesticide. Examples could be temperature extremes, excessive moisture or humidity, heat, sunlight, friction, or contaminating substances or media.

2. Physical requirements of storage which might adversely affect the container of the product and its ability to continue to function properly. Requirements might include positioning of the container in storage, storage or damage due to stacking, penetration of moisture, and ability to withstand shock or friction.

3. Specifications for handling the pesticide container, including movement of container within the storage area, proper opening and closing procedures (particularly for opened containers), and measures to minimize exposure while opening or closing container.

4. Instructions on what to do if the container is damaged in any way, or if the pesticide is leaking or has been spilled, and precautions to minimize exposure if damage occurs.

5. General precautions concerning locked storage, storage in original container only, and separation of pesticides during storage to prevent cross-contamination of other pesticides, fertilizer, food, and feed.

6. General storage instructions for household products should emphasize storage in original container and placement in locked storage areas.

B. Pesticide Disposal Instructions:

The label of all products, except those intended solely for domestic use, must bear explicit instructions about pesticide disposal. The statements listed below contain the exact wording that must appear on the label of these products:

1. The labels of all products, except domestic use, must contain the statement, "Do not contaminate water, food, or feed by storage or disposal."

2. Except those products intended solely for domestic use, the labels of all products that contain active ingredients appearing on the "Acutely Hazardous" Commercial Pesticide Products List (RCRA "E" List) at the end of this appendix or are assigned to Toxicity Category I on the basis of oral or dermal toxicity, skin or eye irritation potential, or Toxicity Category I or II on the basis of acute inhalation toxicity must bear the following pesticide disposal statement:

   "Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance."

The labels of all products, except those intended for domestic use, containing active or inert ingredients that appear on the "Toxic" Commercial Pesticide Products List (RCRA "F" List) at the end of this appendix or presently meet any of the criteria in Subpart C, 40 CFR 261 for a hazardous waste must bear the following pesticide disposal statement:

"Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance."

Labels for all other products, except those intended for domestic use, must bear the following pesticide disposal statement:

"Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility."

3. Products intended for domestic use only must bear the following disposal statement: "Securely wrap original container in several layers of newspaper and discard in trash."

C. Container Disposal Instructions

The label of each product must bear container disposal instructions appropriate to the type of container.

1. All products intended for domestic use must bear one of the following container disposal statements:

Container Type	Statement
Non-aerosol products (bottles, cans, jars)	Do not reuse container (bottle, can, jar). Rinse thoroughly before discarding in trash.
Non-aerosol products (bags)	Do not reuse bag. Discard bag in trash.
Aerosol products	Replace cap and discard containers in trash. Do not incinerate or puncture.

2. The labels for all other products must bear container disposal instructions, based on container type, listed below:

Container Type	Statement
Metal containers (non-aerosol)	Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.
Plastic containers	Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.
Glass containers	Triple rinse (or equivalent). Then dispose of in a sanitary landfill or by other approved state and local procedures.

Container Type	Statement
Fiber drums with liners	Completely empty liner by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application equipment. Then dispose of liner in a sanitary landfill or by incineration if allowed by state and local authorities. If drum is contaminated and cannot be reused[1], dispose of in the same manner.
Paper and plastic bags	Completely empty bag into application equipment. Then dispose of empty bag in a sanitary landfill or by incineration, or, if allowed by State and local authorities, by burning. If burned, stay out of smoke.
Compressed gas cylinders	Return empty cylinder for reuse (or similar wording).

[1] Manufacturer may replace this phrase with one indicating whether and how fiber drum may be reused.

3. The labels for all other products must bear container disposal instructions, based on container type, listed on the first page of this Appendix.

Pesticides that are hazardous wastes under 40 CFR 261.33(e) and (f) when discarded.

"Acutely Hazardous" Commercial Pesticides (RCRA "E" List) Active Ingredients, (no inerts):

Acrolein
Aldicarb
Aldrin
Allyl alcohol
Aluminum phosphide
4-Aminopyridine
Arsenic acid
Arsenic pentoxide
Arsenic trioxide
Calcium cyanide
Carbon disulfide
p-Chloroaniline
Cyanides (soluble cyanide salts, not specified elsewere)
Cyanogen chloride
2-Cyclohexyl-4,6-dinitrophenol
Dieldrin
0,0-Diethyl S-[2-ethylthio)ethyl] phosphorodithioate
    (disulfoton, Di-Syston)
0,0-Diethyl 0-pyrazinyl phosphorothioate (Zinophos)
Dimethoate
0,0-Dimethyl 0-p-nitrophenyl phosphorothioate (methyl parathion)
4,6-Dinitro-o-cresol and salts
4,6-Dinitro-o-cyclohexylphenol
2,4 Dinitrophenol
Dinoseb
Endosulfan
Endothall
Endrin
Famphur
Fluoroacetamide
Heptachlor
Hexanethyl tetraphosphate
Hydrocyanic acid
Hydrogen cyanide
Methomyl
alpha-Naphthylthiourea (ANTU)
Nicotine and salts
Octamethylpyrophosphoramide (OMPA, schradan)
Parathion

"Acutely Hazardous" Commercial Pesticides (RCRA "E" List) Active Ingredients continued:

Phenylmercuric acetate (PMA)
Phorate
Potassium cyanide
Propargyl alcohol
Sodium azide
Sodium cyanide
Sodium fluoroacetate
Strychnine and salts
0,0,0,0-Tetraethyl dithiopyrophosphate (sulfotepp)
Tetraethyl pyrophosphate
Thallium sulfate
Thiofanox
Toxaphene
Warfarin
Zinc phosphide

There are currently no inert ingredients for commercial pesticides on the "Acutely Hazardous" List (RCRA "E" List).

"Toxic" Commercial Pesticide Products (RCRA "F" List) Active Ingredients:

Acetone
Acrylonitrile
Amitrole
Benzene
Bis(2-ethylhexyl)pthalate
Cacodylic acid
Carbon tetrachloride
Chloral (hydrate)
Chlordane (technical)
Chlorobenzene
4-Chloro-m-cresol
Chloroform
o-Chlorophenol
4-Chloro-o-toluidine hydrochloride
Creosote
Cresylic acid
Cyclohexane
Decachlorooctahydro-1,3,4-metheno-2H-cyclobuta[c,d]-pentalen-2-one
    (kepone, chlordecone)
1,2-Dibromo-3-chloropropane (DBCP)
Dibutyl phthalate
S-3,3-(Dichloroallyl diisopropylthiocarbamate (diallate, Avadex)
o-Dichlorobenzene
p-Dichlorobenzene
Dichlorodifluoromethane (Freon 12®)
3,5-Dichloro-N-(1,1-dimethyl-2-propynyl) benzamide (pronamide,Kerb)
Dichloro diphenyl dichloroethane (DDD)
Dichloro diphenyl trichloroethane (DDT)
Dichlorethyl ether
2,4-Dichlorophenoxyacetic, esters and salts (2,4-D)
1,2-Dichloropropane
1,3-Dichloropropane (Telone)
Dimethyl phthalate
Ethyl acetate
Ethyl 4,4'-dichlorobenzilate (chlorobenzilate)
Ethylene dibromide (EDB)
Ethylene dichloride
Ethylene oxide
Formaldehyde
Furfural
Hexachlorobenzene
Hexachlorocyclopentadiene
Hexachloroethane
Hydrofluoric acid

"Toxic" Commercial Pesticide Products (RCRA "F" List)
Active Ingredients:

Isobutyl alcohol
Lead acetate
Lindane
Maleic hydrazide
Mercury
Methyl alcohol
Methyl bromide
Methyl chloride
2,2'-Methylenebis (3,4,6-trichlorophenol) (hexachlorophene)
Methylene chloride
Methyl ethyl ketone
4-Methyl-2-pentanone (methyl isobutyl ketone)
Naphthalene
Nitrobenzene
p-Nitrophenol
Pentachloroethane
Pentachloronitrobenzene (PCNB)
Pentaclorophenol
Phenol
Phosphorodithioic acid, 0,0-diethyl, methyl ester
Propylene dichloride
Pyridine
Resorcinol
Safrole
Selenium disulfide
Silvex
1,2,4,5-Tetrachlorobenzene
1,1,2,2-Tetrachloroethane
Tetrachloroethylene
2,3,4,6-Tetrachlorophenol
Thiram
Toluene
1,1,1-Trichloroethane
Trichloroethylene
Trichloromonofluoromethane (Freon 11®)
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)
Xylene

"Toxic" Commercial Pesticide Products (RCRA "F" List) Inert Ingredients:

Acetone
Acetonitrile
Acetophenone
Acrylic acid
Aniline
Benzene
Chlorobenzene
Chloroform
Cyclohexane
Cyclohexanone
Dichlorodifluoromethane (Freon 12®)
Diethyl phthalate
Dimethylamine
Dimethyl phthalate
1,4-Dioxane
Ethylene oxide
Formaldehyde
Formic acid
Isobutyl alcohol
Meleic anhydride
Methyl alcohol (methanol)
Methyl ethyl ketone
Methyl methacrylate
Naphthalene
Saccharin and salts
Thiourea
Toluene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichlorofluoromethane (Freon 11
Vinyl chloride
Xylene